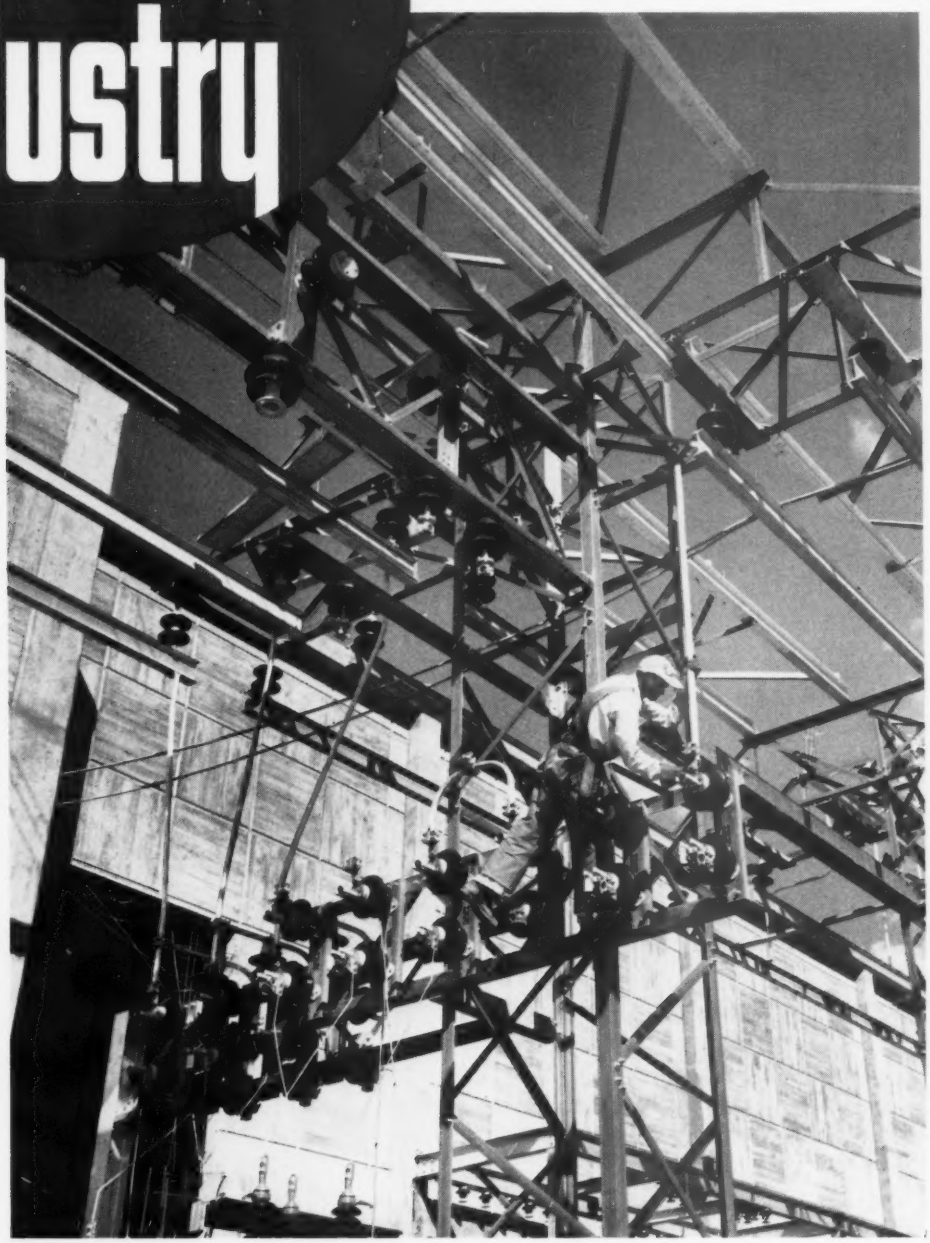
Western Industry

May 1954



Makers of aluminum use aluminum; finishing touches on tower and bus structures of a reduction works in the Pacific Northwest.
. . . see page 30

VARIED READER DIET

Samples from this issue . . . production and quality control, welding, human relations

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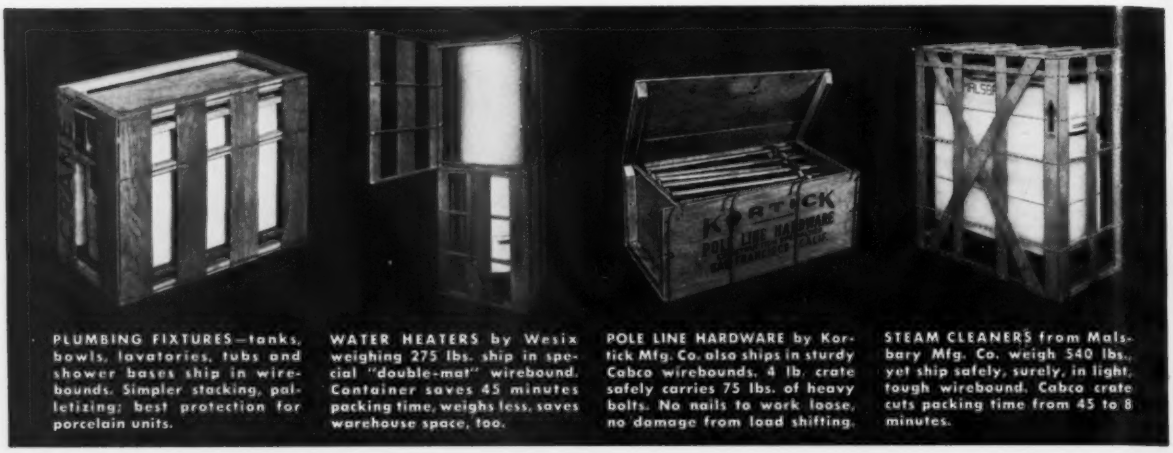
Ever realize how many kinds of



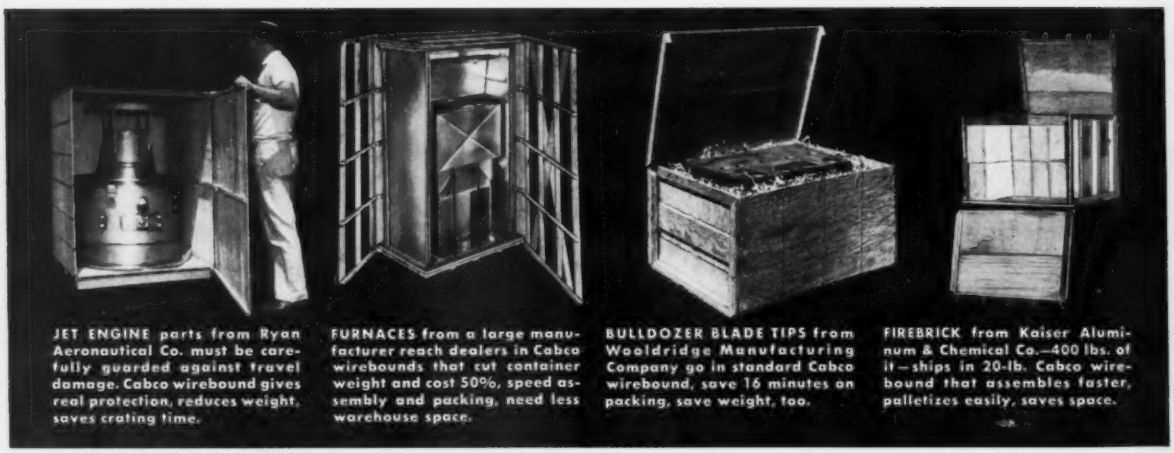
PLUMBING FIXTURES—tanks, bowls, lavatories, tubs and shower bases ship in wirebounds. Simpler stacking, palletizing; best protection for porcelain units.

WATER HEATERS by Wesix weighing 275 lbs. ship in special "double-mat" wirebound. Container saves 45 minutes packing time, weighs less, saves warehouse space, too.

POLE LINE HARDWARE by Kortick Mfg. Co. also ships in sturdy Cabco wirebounds. 4 lb. crate safely carries 75 lbs. of heavy bolts. No nails to work loose, no damage from load shifting.

STEAM CLEANERS from Malsbary Mfg. Co. weigh 540 lbs., yet ship safely, surely, in light, tough wirebound. Cabco crate cuts packing time from 45 to 8 minutes.

products ship more economically



JET ENGINE parts from Ryan Aeronautical Co. must be carefully guarded against travel damage. Cabco wirebound gives real protection, reduces weight, saves crating time.

FURNACES from a large manufacturer reach dealers in Cabco wirebounds that cut container weight and cost 50%, speed assembly and packing, need less warehouse space.

BULLDOZER BLADE TIPS from Wooldridge Manufacturing Company go in standard Cabco wirebound, save 16 minutes on packing, save weight, too.

FIREBRICK from Kaiser Aluminum & Chemical Co.—400 lbs. of it—ships in 20-lb. Cabco wirebound that assembles faster, palletizes easily, saves space.

in Cabco wirebound containers?

Add up the real cost of your present shipping container. How much to buy the container or its parts? How much to assemble; to pack? How much extra shipping cost for container weight that contributes nothing to strength?

Then, let a Cabco engineer show you the practical economics of Cabco wirebounds. These light, tough containers are engineered to your product. They fit perfectly, pack swiftly, save up to 50% on packing and shipping costs.

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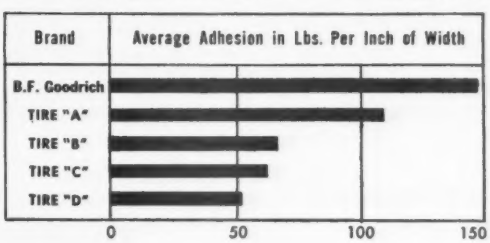
Savings of as much as 50% on industrial tire costs have been reported by users across the country through the use of the B. F. Goodrich Tire and Wheel Analysis Plan! Tire maintenance costs have been reduced 20% and more! This free analysis plan can save *you* money, too. Merely contact your local BFG retailer or mail the coupon below. Without cost or obligation, a trained B. F. Goodrich man will study your materials handling operations. He will tell you what type and size tires, what tread design and compound will serve you best.

The advice and counsel you get will be unbiased, for B. F. Goodrich makes a *complete* line of industrial tires. A special TW Analysis is available for manufacturers of industrial hauling equipment.

AVOID TIRE FAILURES LIKE THIS. Poor adhesion of rubber to steel caused this tire to fail prematurely. The chart below, based on extensive comparison tests of leading makes of tires, proves the superior adhesion qualities built into BFG solid industrial tires.

Tests Prove B. F. Goodrich Adhesion Best



Cutting and chipping? Uneven or littered hauling surfaces soon ruin tires. BFG's TW Analysis shows you how to get maximum tire life.

Hauling surfaces, heat, inside or outside hauling, weight of loads—all must be considered in order to select the right tire. Let the BFG man solve these problems for you.

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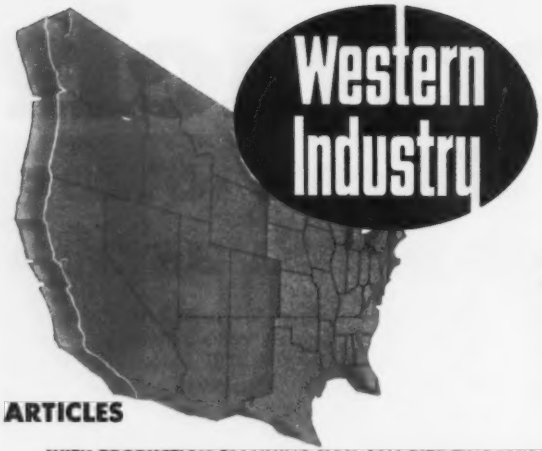
City_____ Zone____ State____



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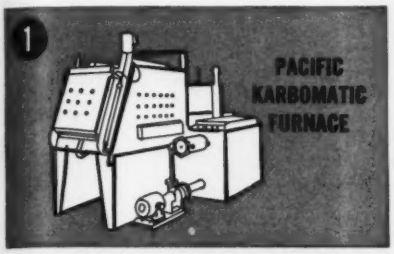

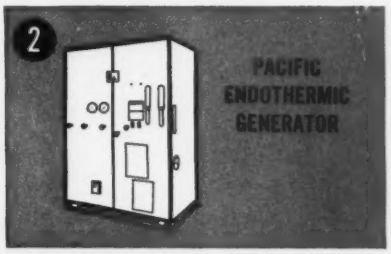

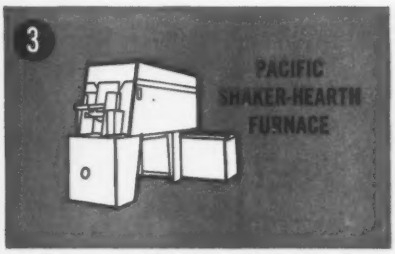

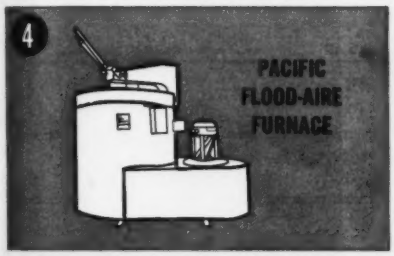

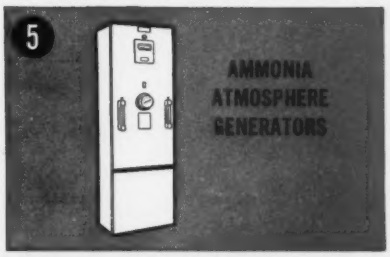

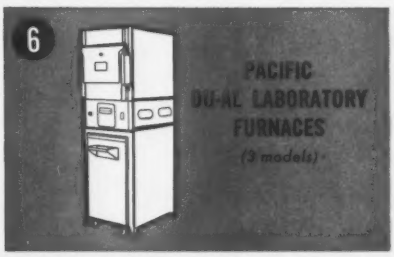

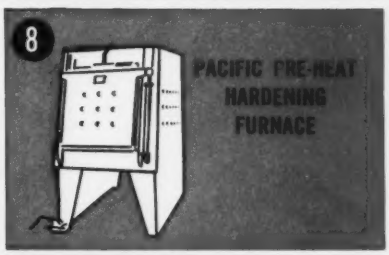

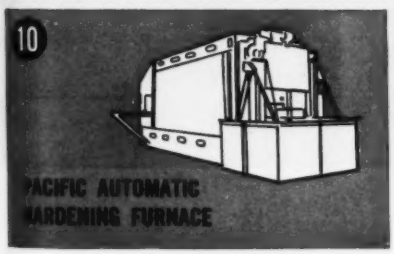

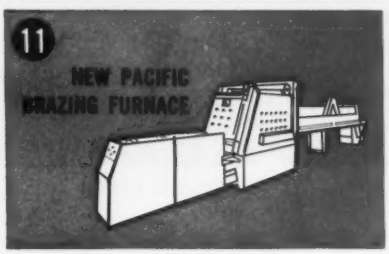

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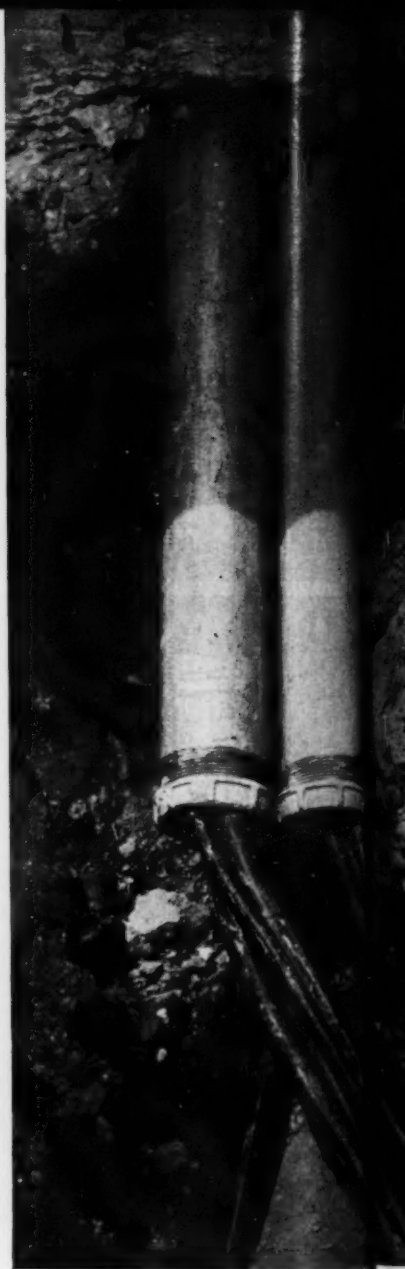

. . . FOR PLANTS

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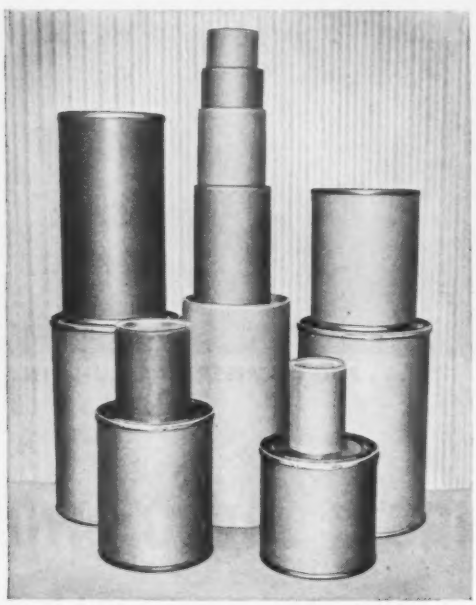

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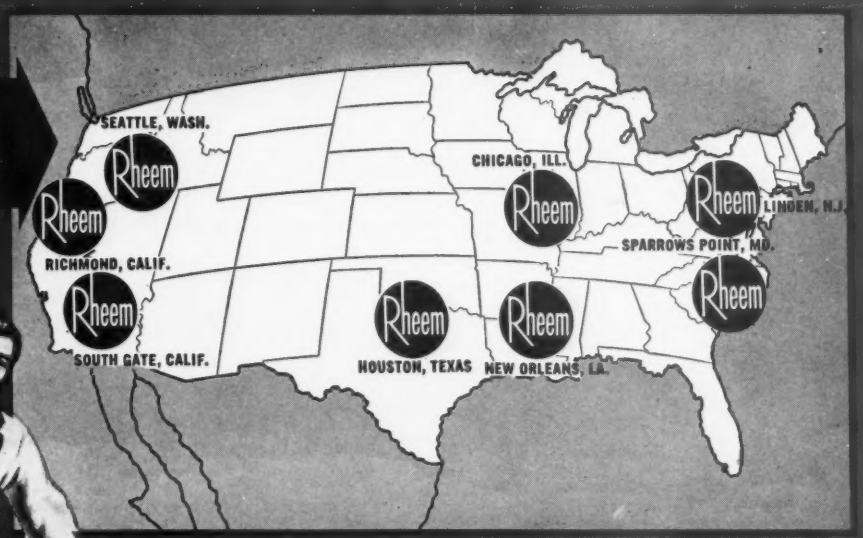

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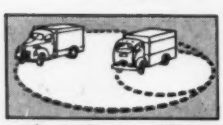

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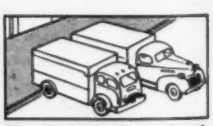

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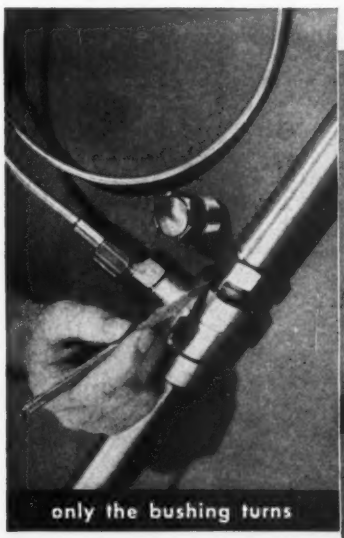

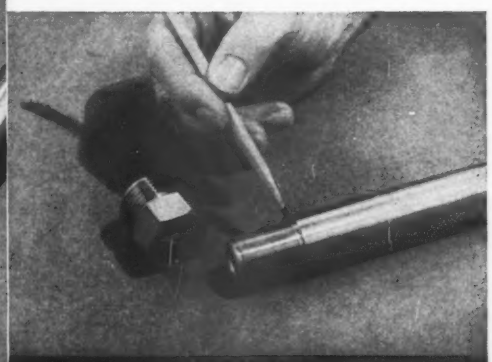

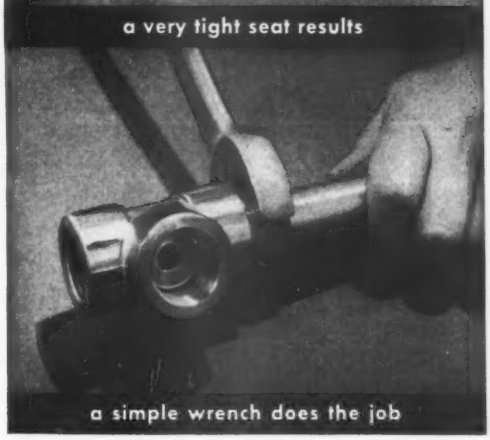

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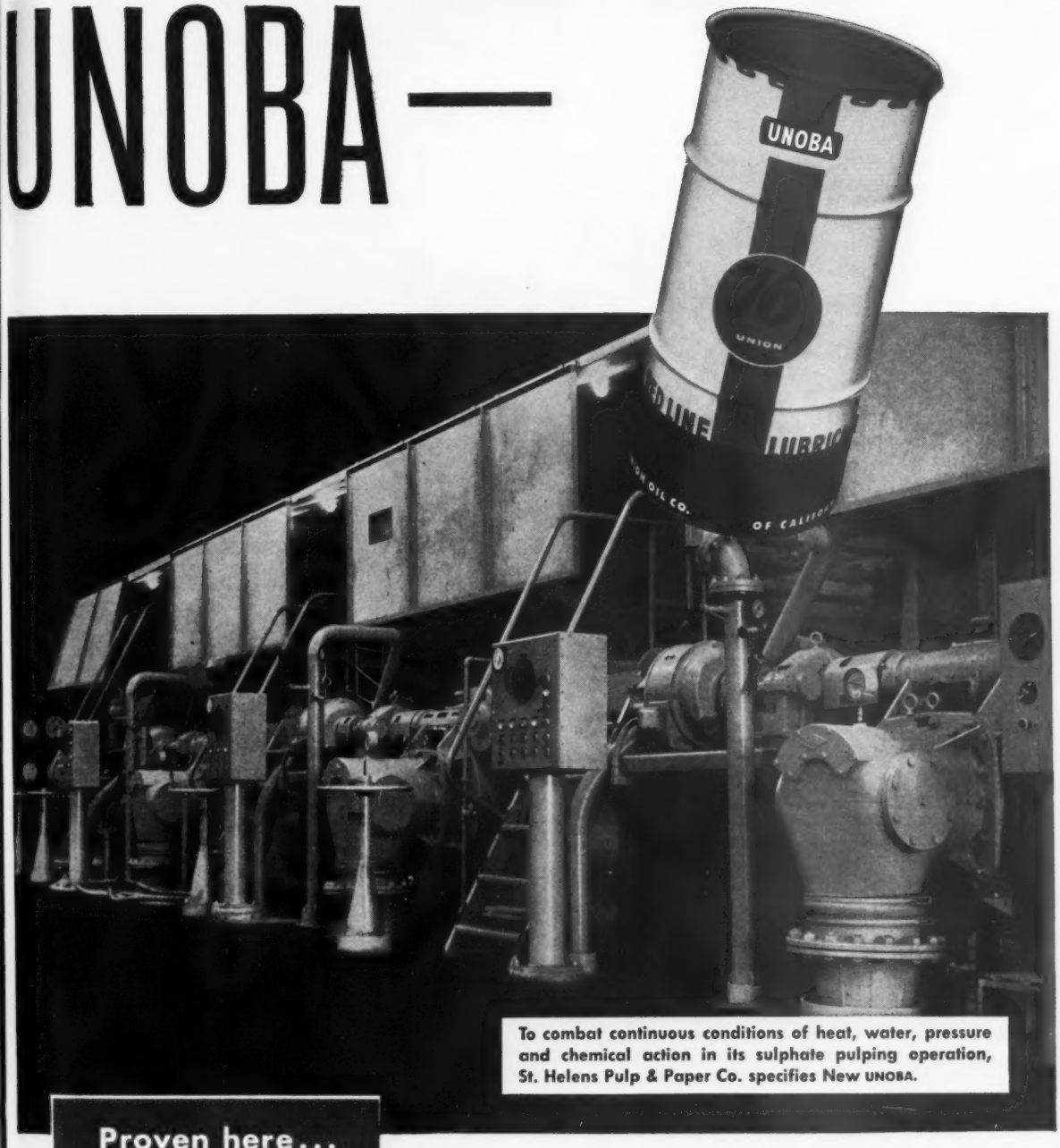
UNOBA—



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In a very real sense, DEPENDABILITY is what Consolidated Freightways has to sell. You find evidence of this in our round-the-clock operations on 19,000 miles of routes; daily service to thousands of firms at more than 900 points from Chicago to the West Coast; 60 modern freight terminals and warehouses; friendly, efficient personnel; and transportation and distribution services to fit your various needs.

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UNITED STATES STEEL AT WORK IN THE WEST – the Metropolitan Aqueduct in Southern California

WATER FOR MILLIONS . . . delivered by steel!

From this intake pumping plant on the Colorado River, almost a billion gallons of water a day start a 457-mile journey to more than 4,000,000 people in Southern California. Begun in 1932, the Metropolitan Aqueduct was completed in 1941. And a large share of the steel that went into the pipelines, pumping plants, tunnels, reservoirs, and siphons came from the mills of United States Steel.

For any job, big or small—Columbia-Geneva for years has made steel of many types. We hope that when you need steel, you'll continue to look first to Columbia-Geneva, Western producing member of the industrial family that serves the nation—United States Steel.

West's Largest Steel Producer

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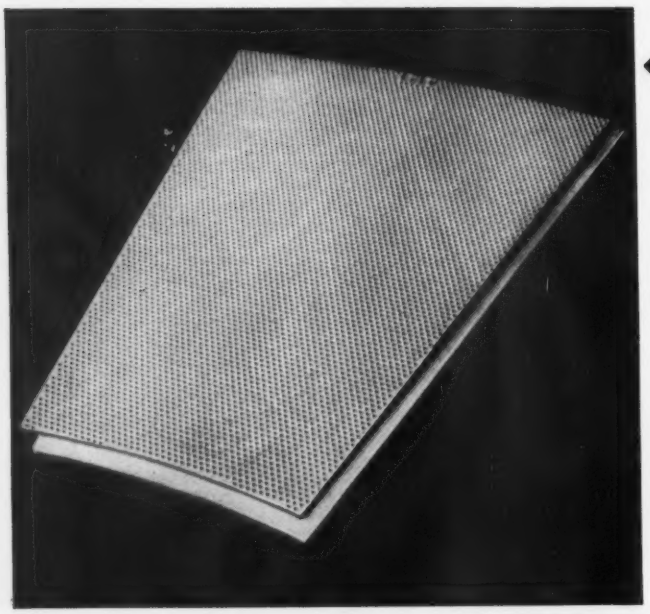
UNITED STATES STEEL

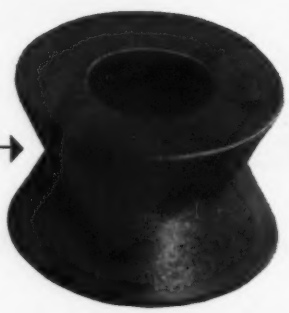
Now They Are Mass Produced

by HAYNES Investment Casting
Trade-Mark



IMPROVED DESIGN AND MATERIAL—The tiny needle-sharp points covering this plate must resist severe abrasion. Machined points used to wear out frequently because they were pyramidal in shape and highly susceptible to erosion. HAYNES investment casting made it possible to cast the points in a more stable conical shape from a hard, wear-resistant alloy. Life has been increased by 5 to 12 times.

EXCELLENT SURFACE QUALITY—For sanitary reasons, not even the smallest crevice can be tolerated on this cream separator part. Because of the high quality of HAYNES investment castings, it was found that the intricate part could be manufactured on a production basis with a minimum of imperfections showing up during the final polishing operations. This eliminated a great deal of wasted time, work, and metal.



NO MORE MACHINING—HAYNES investment casting eliminated the job of machining these rollers. Service conditions require that the rollers be made of a special alloy which is difficult to machine. They must resist rusting and the cutting action of wire passing over them under tension. The rollers give excellent service life and there are no more machining problems.

HAYNES *investment castings can solve some of your own production and design problems. For more information, contact the nearest Haynes Stellite Company office listed below.*

"Haynes" is a registered trade-mark of Union Carbide and Carbon Corporation.

HAYNES INVESTMENT CASTINGS
Trade-Mark

Sound, dense, high-strength parts available in cobalt-base alloys, nickel-base alloys, iron-base alloys, stainless steels, and alloy and carbon steels.

Haynes Stellite Company
A Division of
Union Carbide and Carbon Corporation
UCC
General Offices and Works, Kokomo, Indiana
Sales Offices
Chicago — Cleveland — Detroit — Houston
Los Angeles — New York — San Francisco — Tulsa

An important announcement

to buyers of metal...

CHASE NOW SELLS STAINLESS STEEL, TOO

Sheets, Plates, Bars, Wire, Pipe and Tubing now available through Chase warehouses and sales offices

Now you can get Stainless Steel from Chase! Along with our regular brass and copper products, Chase can now supply Stainless Steel.

This line has been added as an extra service to metal buyers. Now you can get Stainless Steel, brass and copper from the same source. The same cutting facilities provided on regular Chase products are now available on Stainless Steel orders, too. Anything not in stock locally can be shipped promptly from another Chase warehouse or from the mill.

For service...for quality... in Stainless Steel, too, call your nearest Chase warehouse or sales office.

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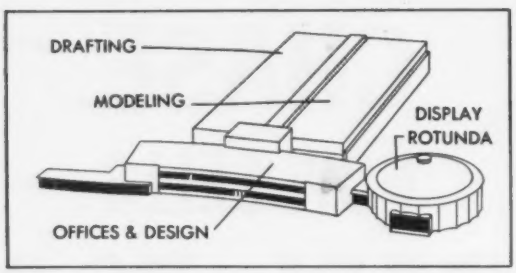
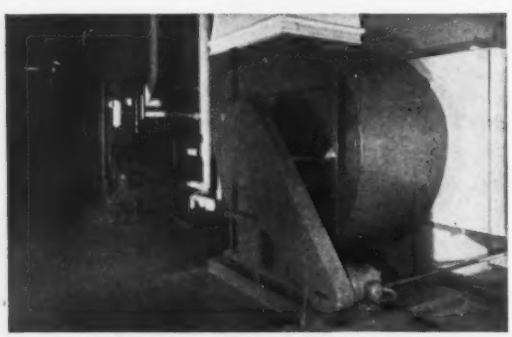
CHASE BRASS & COPPER CO., WATERBURY 20, CONN., Warehouses and Sales Offices at:— Albany† Atlanta Baltimore Boston Chicago Cincinnati Cleveland Dallas Denver† Detroit Houston Indianapolis Kansas City, Mo. Los Angeles Milwaukee Minneapolis Newark New Orleans New York Philadelphia Pittsburgh Providence Rochester† St. Louis San Francisco Seattle Waterbury (†sales office only)

Advanced Styling Section of Ford Motor Company's new $11.5 million Styling Building, Dearborn, Michigan.

Ford "dream shop" has built-in climate!



The design-office wing and display rotunda are served by a central system. It includes: 7 supply fans; 34 exhaust fans; heating and cooling coils and sprayed-coil dehumidifiers — all furnished by American Blower.



Air for drafting rooms and modeling studios is conditioned by 24 specially built, automatically controlled American Blower Air-Conditioning Units. Each unit contains heating and cooling coils and capillary air washers.

This "dream shop" at the Ford Engineering Staff's Advanced Styling Section is just one of many styling areas which depend on clean, conditioned air.

For example, in 12 roomy studios clay-modeling teams work under lights which produce shadowless illumination — and intense heat! To absorb this heat and provide the proper climate for working with clay models, specially designed air-conditioning systems were installed for each studio and drafting room. American Blower Air Handling and Air-Conditioning Equipment was used for this unusual assignment.

The expert know-how of American Blower engineers is on tap for industry at all times. If you have an air-handling or air-conditioning problem, phone your nearest American Blower or Canadian Sirocco Branch Office.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

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Serving home and industry:
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You don't need to freeze money in inventory!

WHEN YOU BUY STEEL FROM WAREHOUSE, YOU GET:

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- LOWER TIME COSTS
- LOWER CAPITAL INVESTMENT
- FASTER PRODUCTION
- FEWER INVENTORY LOSSES

LET your U. S. Steel Supply warehouse serve as your inventory stock. Then you eliminate from your overhead the cost of carrying your own inventory, and free a substantial portion of your capital for other purposes. U. S. Steel Supply can always deliver the steel you want to your plant or job site at the time you specify. Just tell your U. S. Steel Supply salesman what you want . . . when . . . and where.

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UNITED STATES STEEL

2 New Services from Crane

How to Choose the Right Valve for Each Piping Job

HOW TO GET THESE FREE HELPS

Easiest way: phone your local Crane Representative—let him schedule a film showing for your group and supply the "take-home" handbooks. If more convenient, just drop a line to the address below.

Men responsible for specification, operation, and maintenance of industrial piping systems will get a real "refresher" from these new Crane customer services. Both film and handbook deal with the common problems of matching up valve characteristics and specific flow control needs for the most efficient result.

Following a review of basic valve types—gate, globe, angle, and check—variations in design of functional parts, and the effects on serviceability are discussed. All vital elements—disc and seating—disc-stem connection, bonnet joint, stem operation, etc., are covered. The motion picture stimulates high interest by developing a hypothetical case involving strong differences of opinion on valve selection. The manual—intended for distribution at film showings or for independent use—provides a lasting reference.

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CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

NOW READY FOR *YOU!*

Jorgensen's newest steel and aluminum identification color chart

Jorgensen maintains large and diversified stocks of carbon, alloy, stainless, tool and specialty steels — and all types of aluminum, too. Before delivery to you, each type is painted a distinctive color or combination of colors for ready identification. Users of Jorgensen steel and aluminum find the handy color chart shown above a quick and positive way to identify material, and to distinguish one kind from another. This free color chart is another *extra* Jorgensen service — another reason why it always pays to —

Call Jorgensen First!

WRITE OR PHONE . . .
your nearest Jorgensen office for your free copy of this new 9"x12" Color Chart, mounted on cardboard. A copy is available for you with Jorgensen's compliments.

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- **Low maintenance, no painting required**
- **Clear-span design, more usable area**
- **We install immediately on your site**
- **Readily used with store-front facades**

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Industrial • Commercial
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THOUSANDS IN USE THROUGHOUT THE WEST!

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PLEASE SEND ME illustrated Soulé Standard Steel Building Catalog, showing building types and complete details.

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Rubbish Disposal is only ONE of the Cost Cutting jobs for the Dempster-Dumpster in your plant...

It's amazing, almost to the point of fantasy, yet so soundly real, what the minds of men in all types of industry have cooked up for more efficiency and reduced costs with the Dempster-Dumpster.

Hundreds of plants are handling materials of practically every description with one truck-mounted Dempster-Dumpster serving scores of detachable containers. Here are just a few. Oils, gases, and liquids handled in our Tank Type Containers . . . tools and equipment in our Tool Shed Type Container . . . containers on casters placed for receiving steel chips from lathes or at conveyors for receiving finished products . . . container with doors and windows, replacing shacks for plant guards or nightwatchmen . . . containers built to handle chlorinator ash residue of approximately 1500° F. and there are dozens more.

Containers are placed wherever material accumulates. When loaded each is picked-up, hauled and emptied (as illustrated above) . . . or load set down intact. The entire operation is handled by only one man, the driver, by hydraulic controls in cab.

The containers are built in capacities up to 12 cu. yds. and each is designed to suit the materials to be handled—be they bulky, light or heavy . . . solids, liquids or dust.

One Dempster-Dumpster, with driver, does the work of 3 to 5 conventional trucks . . . eliminates trucks and crews standing idle . . . eliminates rehandling of materials and increases efficiency and good plantkeeping.

If you have even any remote idea that this equipment could be adapted to your operation, by all means contact us because being without the Dempster-Dumpster System could easily be costing your company thousands of dollars annually. Manufactured and sold exclusively by Dempster Brothers, Inc.

One Dempster-Dumpster Handles All Containers . . . . All Sizes . . . . All Designs

DEMPSTER BROTHERS, 554 N. Knox. Knoxville 17, Tennessee

Western Industry

EDITORIALS

A helpful organization

MUCH SPACE has been devoted editorially by *Western Industry* to the need of a discussion forum for over-all Western problems. Just before the end of the war and for a short time thereafter, when there were pressing problems to face immediately, such an organization did spring into being in the shape of the Western States Council, which not only discussed but also promoted united Western action. As these problems were settled, however, the need seemed less and the activity of the Council diminished proportionately, although the West is still highly conscious of itself.

Within one subdivision of the West—Oregon, Washington, Idaho, British Columbia and Alaska—there has grown up an organization, the Pacific Northwest Trade Association, which does for that area what we have always felt needed to be done for the whole West. Its semiannual programs have dealt with such things as electric energy, fuel and trade on an intelligent and informative level, and attendance at the meetings has been steadily increasing.

This association has had the advantage of an obvious community of interest, despite an intervening international boundary, but as time goes on it may find that its relationship to other areas in the West is worth exploring. This in turn might lead to such an overall Western forum as *Western Industry* has been urging.

It is often said that conferences accomplish nothing, but they do clarify thinking in a way that cannot be duplicated, and this is an accomplishment that requires no apology.

Needful reliability

NOT EVERYONE in the West is making guided missiles. Far from it, heaven be praised. But the article in this issue about the astounding accuracy required in the manufacture of components, if the missiles are to reach their targets, is a sober warning to everyone engaged in a military contract.

The author of the article referred to told the American Rocket Society that the main reason for the failure of the German submarine campaign in World War II was the inaccuracy of its torpedoes. Only a minute percentage of them ever reached their mark.

So, if military inspectors sometimes seem unreasonable, if the "specs" seem hopeless to meet, there may be a very good reason for it. Quite possibly these demanding requirements may spell our ability to give an enemy quick and forcible proof that American justice can be effectively backed up.

Schooling doesn't hurt

A TOP MANAGEMENT group in one large Western city is taking a Monday night course in economics from a competent college professor in order to be able to discuss the American economic system intelligently and attractively with supervisors, the rank and file of employees and the unions.

There are plenty of people in top management who believe they can dismiss opposing arguments with a wave of the hand, generalities about the American way of life, sarcastic remarks about the New Deal—or just a plain refusal to budge.

Yet they seem unable to realize that in combatting fringe benefits—often unsuccessfully—they are battling with union officials who have long been studying up on economics—their own brand, to be sure, but nevertheless a brand based on the conditions of today. One manager of an employers negotiating organization reminded his members that they fought violently against socialized medicine when offered by the government, but accepted it without question from the hand of Dave Beck.

Executives cannot meet the challenges of today by relying on economics textbooks of a generation ago, which do not provide ready answers for conditions that have developed since that time. They need the perspective of a trained educator with an analytical approach. They may not agree with everything he tells them, but at least they are not so likely to be caught asleep at the switch.

ANOTHER CALSTEEL COLUMN FABRICATION JOB!

Stanolind Oil and Gas Company
Elk Basin, Parks County, Wyoming

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ENGINEERED FABRICATION

STEEL and ALLOY PLATE
STRUCTURAL · PIPE
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Process, Oil, Gas
Atomic Energy and
Power Industries

● The contributions of CALSTEEL to this installation demonstrate the company's precision execution of the most exacting specifications. Because they are custom made to individual requirements, CALSTEEL fabrications "fill the bill" completely for the Process, Oil, Gas, Atomic Energy and Power Industries. CALSTEEL does a superior job of *custom engineered fabrication.* Call on CALSTEEL to fill your fabrication needs!

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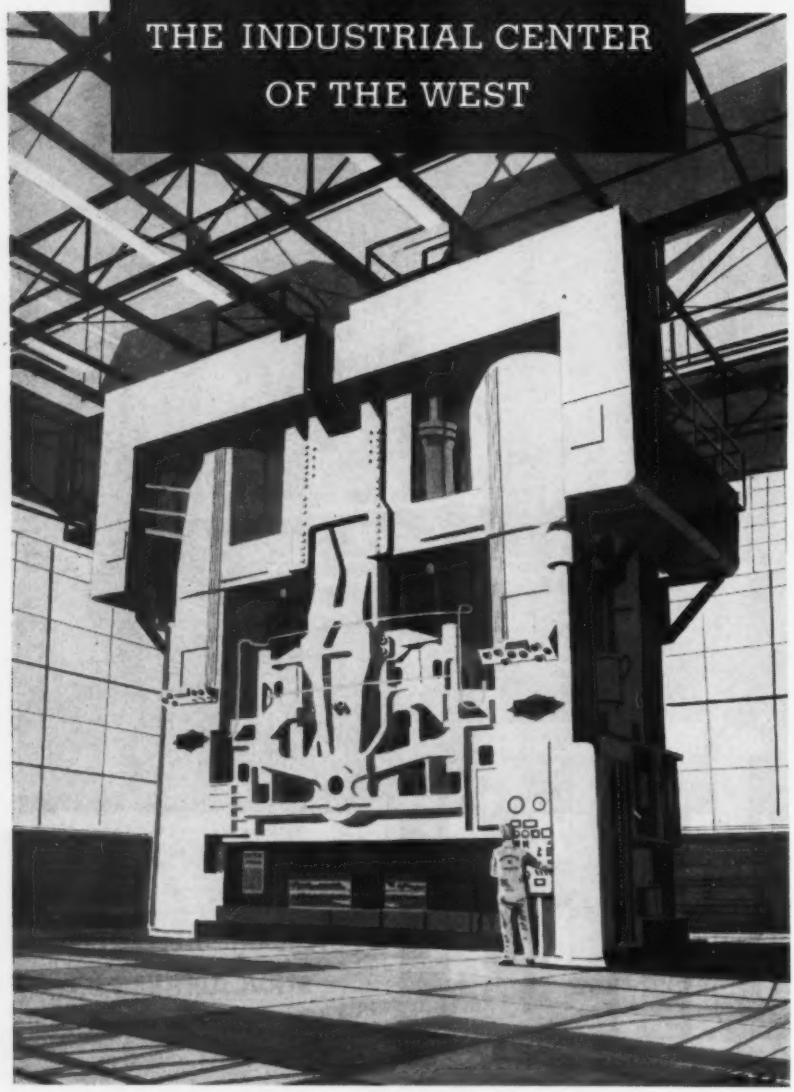
THE INDUSTRIAL CENTER
OF THE WEST



The Industrial
Business-Minded Bank

California Bank

MEMBER FEDERAL DEPOSIT
INSURANCE CORPORATION

Los Angeles

LETTERS

Contributions to this column from our readers are welcome. Names will be withheld from publication if so requested. Unsigned letters, however, will be disregarded.

Indirect compliment

Dear Mr. Prior:

Your article in the February 1954 issue of *Western Industry* on the subject "Is Your Automotive Fleet Costing or Paying?" was one of the finest treatises on this subject that I have ever read.

From my experience I have come to the conclusion that most fleet operators regard this subject as a most evasive and difficult one. Your article, besides being factual, was one of the most thought-provoking bits that I have read in some time.

L. W. GOLDENSON
Industrial Truck Sales, San Francisco

A copy of the above letter, commenting on the lead article in February's Western Industry, *was sent to the editor by Mr. Goldenson.*

Reprint query

Editor, *Western Industry:*

Several months ago you ran an article in *Western Industry* pointing up the need for Western manufacturers to avail themselves of Western architectural services when planning construction of manufacturing plants on the West Coast.

I am wondering if you have available reprints of the article inasmuch as I would like to use them in connection with our work with Eastern and Middle Western industrial prospects.

L. J. HUMPHREYS
Manager, Industrial Department
Sacramento Chamber of Commerce

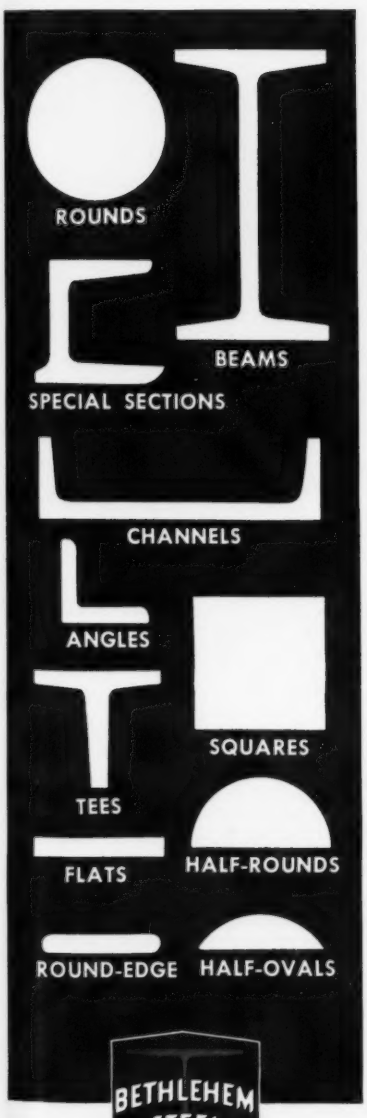
Industrial engineering

Editor, *Western Industry:*

Would you kindly forward me a copy of an article in your March 1954 issue of *Western Industry* written by Martin S. Meyers entitled "A Small Plant Does It."

LAIRD E. HOSKINS
Supervisor of Planning, Ordnance Division
Food Machinery and Chemical Corp.,
San Jose, Calif.

Even the dining room has a use for STEEL BARS



The "wrought-iron" legs are fabricated from Bethlehem Pacific bars by Northwest Metal Products, Kent, Wash. The Harmon Furniture Mfg. Co., Tacoma, uses them to make attractive furniture with a modern touch.

Carbon steel bars, rolled by Bethlehem Pacific, may end up in your dining room one of these days. "Wrought-iron" legs are climbing fast in popularity among furniture makers; and handy husbands are finding them to be just the thing for making book cases, tables, and desks.

Whatever you need in steel bar stock, you can depend on Bethlehem Pacific. We roll a wide variety of sections and sizes at each of our three plants—Los Angeles, South San Francisco, Seattle.

Bethlehem Pacific bars are made only from new-billet steel. They are uniform in grade, true to shape and size. Besides ordinary grades, we roll a number of special grades and sections to meet the needs of our bar customers. We have experienced metallurgists, too, who make a specialty of helping our customers to solve steel fabricating problems.

Write or phone our nearest sales office for full details. Catalog 305-A is yours for the asking.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

Sales Offices: Los Angeles, San Francisco, Portland, Seattle, Spokane

BETHLEHEM PACIFIC

LOCATE YOUR PLANT
near America's Most Modern Port
LONG BEACH, California

Industry Profits from a Better Harbor

Modern industries, seeking the best in efficient sea, land and air transportation, are establishing plants in the industrial area surrounding the Port of Long Beach.

In the center of industrial Long Beach is its Harbor, which has developed even more amazingly than the growth of the city. Only ten minutes from the open sea, the Port has many modern facilities for serving industries, such as the world's largest clear-span cargo transit shed, the world's longest pier, America's first shore-based harbor radar installation, to mention only a few. Industry, too, agrees that the Port of Long Beach is indeed America's Most Modern Port.

Three transcontinental railways, plus an inter-city electric railway, also serve the area. The modern, city-owned airport provides transcontinental air service. Over 2100 common carrier truck lines service Long Beach over the ever-expanding network of freeways.

Other Industrial Advantages

There are at least twelve other reasons for locating your new plant in the Long Beach Harbor area. Included are rich market area, large labor pool, lowest electric rates, cheap and ample gas, abundant water supply, profit-making climate, better living, low taxes, available raw materials, transportation savings and economic stability.

Write for free industrial brochure and complete details — in confidence, if you like. This invitation is extended by the City of Long Beach and its Board of Harbor Commissioners.

CHAMBER OF COMMERCE • DEPARTMENT OF INDUSTRY

200 East Ocean Boulevard, Long Beach 2, California

CALENDAR OF MEETINGS

MAY 19-21—*Pacific Coast Electrical Assn.*, Hotel del Coronado, Coronado, Calif. Contact V. W. Hartley, 530 W. 6th St., Los Angeles.

MAY 21-22—*Redwood Region Logging Conference and Equipment Show*, 12th district fair grounds, Ukiah, Calif. Contact V. H. Jones, coordination chairman c/o Chamber of Commerce, 105 N. Main St., Ukiah.

MAY 27-29—*California Society of Professional Engineers*, convention and trade show, Mark Hopkins Hotel, San Francisco. Contact I. H. McCarty, convention chairman, 323 Geary St., San Francisco.

JUNE 8-9—Third biennial *Packaging and Materials Handling Institute*, University of Southern California, Los Angeles. Contact Prof. John R. Huffman, USC.

JUNE 13-JULY 23—*Advanced Management Seminar*, course in executive development, University of Washington, Seattle. Contact E. G. Brown, seminar director, U. of W.

JUNE 24-27—*National Truck, Trailer, and Equipment Show*, Pan Pacific auditorium, Los Angeles. Contact J. M. Collins, Carnation Co., Los Angeles.

JUNE 27-30—*Rocky Mountain Coal Mining Inst.*, Glenwood Springs, Colo. Contact F. Whiteside, 356 Lafayette, Denver.

JUNE 27-30—*Institute of Food Technologists*, Hotel Biltmore, Los Angeles. Contact A. N. Prater, Gentry Div., Consolidated Grocers Corp., Box 2076, Terminal Annex, Los Angeles.

JULY 13-15—*Western Plant Maintenance Show*, Pan-Pacific Auditorium, Los Angeles. Contact W. J. Wilkin, Clapp & Poliak, Inc., 759 Monadnock Bldg., San Francisco 5.

AUG. 25-27—*Western Electronic Show and Convention*, Los Angeles. Show at Pan-Pacific Auditorium. Convention headquarters, Ambassador Hotel. Contact M. Mobley, Jr., 344 N. La Brea Ave., Los Angeles 36.

OCT. 8—*Washington Assn. of Operating Millers*, state meeting, Davenport Hotel, Spokane, Wash. Contact W. W. Liley, 1211 E. Sprague Ave., Spokane.

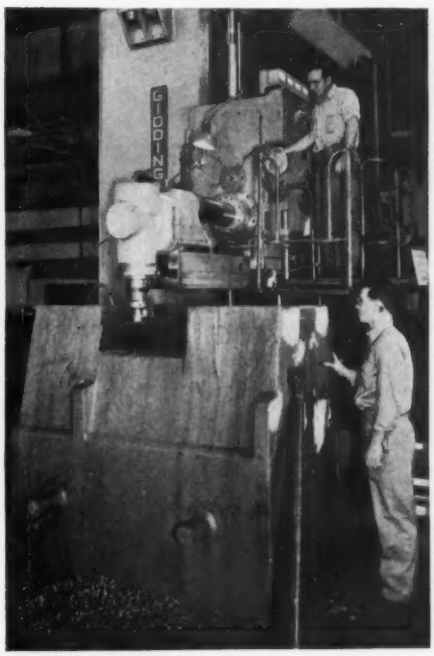
OCT. 25-27—*National Lubricating Grease Inst.*, San Francisco. Contact H. F. Bennetts, executive secretary, 4638 J. C. Nichols Parkway, Kansas City 12, Mo.

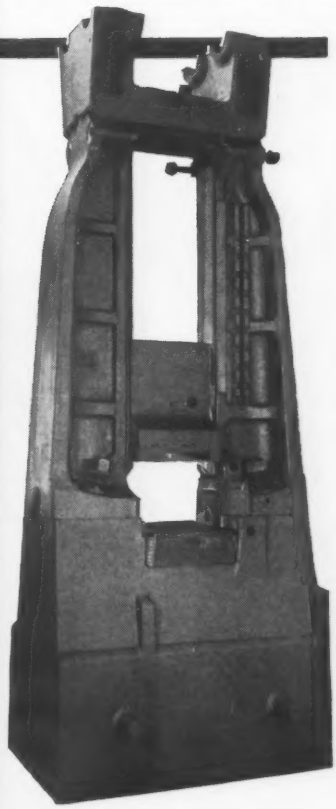
DEC. 3-4—*Northwest Mining Assn.*, Davenport Hotel, Spokane, Wash. Contact Association, MA 4822, Spokane.

45,000 LB. DROP FORGE HAMMER BASE

cast | machined | assembled

BY NATIONAL SUPPLY





In the casting stage, this hammer base weighed 74,000 pounds. It is the largest single-piece steel casting ever poured from National's melting furnaces.

After trimming it, National's skilled operators machined it to specifications. Then they assembled the base with its matching parts and checked it for correct alignment. When delivered, the big drop hammer was ready for action on the customer's production line.

This is typical of the many big, precision jobs that National Supply can do through the fully integrated facilities of its Torrance plant. From melting furnace to finished product, these facilities serve the most exacting needs of western industry. Why not put them to work whenever you have special equipment needs?

INDUSTRIAL PRODUCTS DIVISION

THE NATIONAL SUPPLY COMPANY

TORRANCE, CALIFORNIA • LOS ANGELES AREA

IDEAL PRESSED STEEL FORGINGS • BILLETS AND LARGE BARS
STEEL CASTINGS AND SPECIAL MACHINERY
MELTING • FORGING • CASTING • MACHINING • HEAT TREATING
ASSEMBLING • WELDING . TESTING

Snap-on* VACUUM GRIP PLIERS ...the *right* pliers for every job!

● Choose from more than 30 Snap-on types and sizes. Each is built to perform its specific gripping, cutting or twisting function *faster, easier, more safely* than any other pliers. Snap-ons are heat-treated from surface to core and the jaws, cutting edges and joints are locally tempered to exact degree of hardness and toughness for greatest durability. Write for catalogs described above. Snap-on branch warehouses in principal industrial centers offer direct service to industry everywhere.

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8032-E 28th Avenue, Kenosha, Wisconsin

*Snap-on is the trademark of Snap-on Tools Corporation

THIS MONTH'S COVER

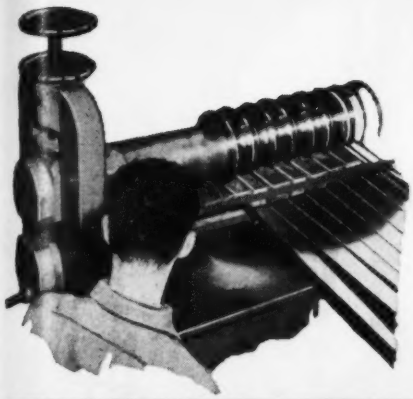
MORE ALUMINUM for the Northwest

"AN EXPORTABLE commodity utilizing a replaceable resource" hints at the role of aluminum in the economy of the West, and the Pacific Northwest in particular. Since the first aluminum processing plant moved into the Pacific Northwest to take advantage of hydroelectric power available at low rates, virtually every large firm in the aluminum field has seen fit to establish a plant in the area. The Northwest in 1953 produced an estimated 475,000 tons of aluminum, or 40% of the nation's output.

Manufacturers of automobiles, boats, trucks, trailers and numerous other firms in the area have become users of the light metal in the past few years, and there is apparently still plenty of room for expansion of application. Outstanding progress has also been made in architectural applications with the curtain wall, and the production and use of semi-rigid containers for food products and irrigation systems, in both of which the West is a leader.

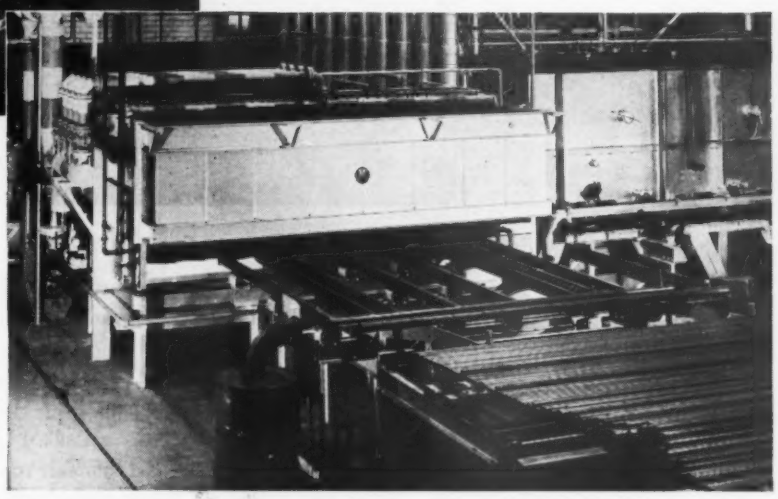
Addition of Aluminum Company of America's new $45,000,000 aluminum smelting plant near Wenatchee, Wash., in 1953 is expected to increase Northwest capacities in 1954 by another 8,500 tons and employ more than 900 persons. Covering 19 acres under one roof and entirely financed with private capital, the Wenatchee plant is the first to be erected since World War II. Extensive use of aluminum bus and conductor cable was made in its construction. Electrical energy for the plant is supplied chiefly from nearby Rock Island dam.

AIR VIEW of Alcoa's new aluminum smelter on the Columbia River near Wenatchee, Wash.



How Rome Cable Corp. makes rigid conduit from USS Hot Rolled Sheets

Making rigid conduit in sizes ranging from ½" on up to 2", strips of hot rolled steel are fed through a series of forming rolls on this tube mill (left). The seam is closed by electric resistance welding. Because of Rome Cable Corporation's unique process for producing rigid conduit, they can use hot rolled sheet steel and thereby achieve remarkably uniform inside diameter measurements and weight.



Hot-dip galvanizing is done by the Sendzimir Process (right). Under atmospheric control, all dirt, oil, etc., is burned off in the flame preheater, which also produces a uniform blue oxide on the pipe. In the reducing furnace the pipe is annealed and the hydrogen atmosphere reduces the blue oxide to a smooth, stainless surface. The pipe is then fed directly into the molten zinc bath (no pickling or fluxing is required) and, after emergence, excess molten zinc is removed by an air and superheated steam wipe.

Final inspection takes place after the product has been threaded and lacquered. Electrical metallic tubing, another Rome Cable Corp. item, is being inspected in this photo (left). The finished product is just one of the many examples of United States Steel at work. From start to finish... from open hearth to rolling mill . . . steel from USS is designed to do the best job for you. For additional information, or technical assistance, call your nearest Columbia-Geneva District Sales Office, or write Columbia-Geneva Steel Division, 1403 Russ Building, San Francisco 6, Calif.

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Bars—Shapes—Plates

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Western Industry

MAY 1954

WITH PRODUCTION PLANNING YOU CAN RIDE TWO HORSES

Simultaneous civilian and military work meshes smoothly

BUILDING coin-operated bottle vending machines, outboard wings for aircraft and an accessory for a Navy sonar device at the same time in the same place gives rise to a difficult problem in production planning.

The experience of Vendorlator Manufacturing Co. of Fresno, Calif., in meeting this problem is an interesting example of how such diversified products can be handled simultaneously with success.

Vendorlator is the oldest and one of the largest producers of coin-operated bottle vending machines in the world. These vending machines are at present used exclusively in the dispensing of various types of bottled soft drinks. In addition, the firm is a major subcontractor of Douglas Aircraft Co.'s El Segundo Division.

Subcontract unique

It is sole source for the outboard wings and an accessory for a Navy sonar device for the Skyraider series of Douglas airplanes. The company's subcontract is unique in that it has a fabrication contract for component parts as well as an assembly contract.

Vendorlator's organization is divided into seven main divisions: Sales and Service, Finance, Engineering, Quality Control, Industrial Relations, Production and Materiel. With the arrival of the aircraft contract, it was necessary to segregate the proprietary operation from the aircraft operation in the Engineering, Quality Control, Production, and Materiel divisions, with the assistant managers delegated the exclusive responsibility for the proprietary and aircraft operations.

Five basic models of vending machines are currently being manufactured, each model designation representing the number of bottles which can be vended without refilling the machine. These include the "340," "242,"

ON THE CIVILIAN end of the operation, coin mechanisms for bottle vending machines are assembled and tested against rigid quality specifications.

COINS AND SLUGS are fed into the slot to make sure coin mechanisms can tell the difference and make the correct change.

"149," "33," and "27." The "340" is the largest bottle vending machine made in the world and the "27" is the second smallest.

All fabrication facilities, such as shears, punch presses, hydro-press, brakes, spot welders, machine tools, process tanks and many other types, are used interchangeably for both proprietary and aircraft operations. It is this mixing of parts and schedules which posed a problem at the outset of the combination program.

Eighty-five per cent of the fabricated parts comprising an outboard wing and 99% of the fabricated parts comprising a Sonobuoy dispenser are furnished by Vendorlator. Those parts which Douglas furnishes require the type of specialty fabrication equipment which probably would not be found outside the plant of a major airframe manufacturer. Of the fabricated parts which are furnished by the company, 83% are manufactured with their own facilities and 17% are subcontracted to outside vendors.

Approximately 950 different parts are scheduled for the aircraft operation, and approximately 1,050 different parts are made for various vending machine models.

Vending machine fabrication and assembly cycles are on a calendar month basis with a suitable cushion of parts between the lots to stabilize production. Aircraft fabrication lots cover eight weeks' assembly requirements and are run on an eight-week cycle with a two-week lead time plus a small cushion of parts ahead of assembly requirements.

Both aircraft and proprietary fabrication use all the same facilities interchangeably. The shop superintendent's office does the detail equipment loading and thus can run either aircraft or proprietary in sequence or in parallel, on one shift or another shift or all shifts, depending upon which gives the most effective use of the equipment.

A sales forecast of vending machine shipments for a six-month period is maintained and is projected by production control into fabrication and assembly lots. The master delivery schedule of aircraft end-items is translated into fabrication and assembly requirements and projected forward for a full year. From these long-range projections, shop management can forecast raw material and outside production requirements. Finance can forecast its dollar requirements.

A sample fabrication schedule for an eight-week period from March 1, 1954, through April 30, 1954, would produce parts as follows:

	Units	*Component Parts*
Vending machines	7,600	1,265,150
Aircraft	144	89,403
		1,354,553

The fact that the number of parts required for the aircraft operation is only 6.5% of the total volume for a given period is significant of two things:

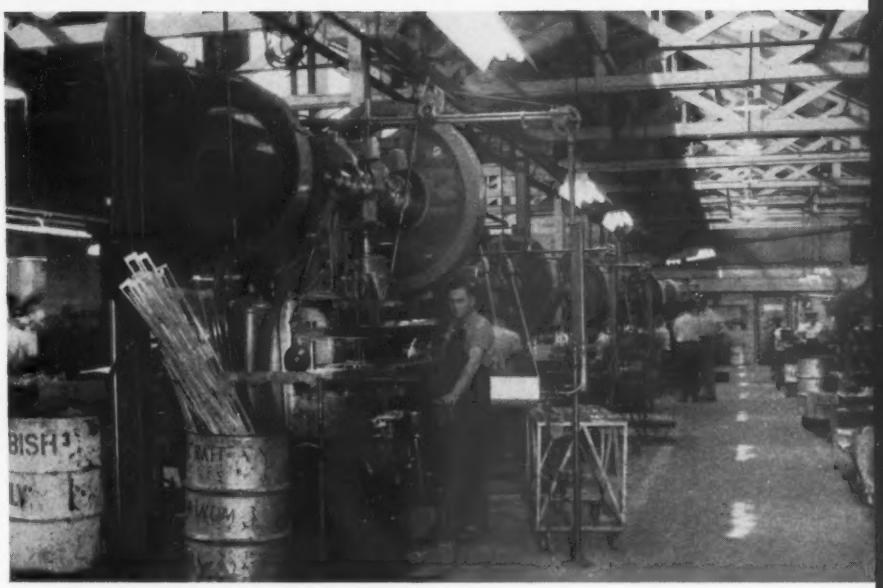
1. The rate of assembly of vending machines on some models is as high as 150 per day, whereas the peak on outboard wings is 14 per week.

2. The complexity, tolerances and Navy specifications for aircraft components is such that more extensive tooling, greater processing and higher unit times are required to complete parts. This is attested to by the fact that fabrication man-hours over a given period are in the approximate ratio of 55% vending to 45% aircraft.

Company tool shop

All fabrication tooling, with the exception of deep draw dies, and all assembly tooling for proprietary items and aircraft contracts are made in the company's own tool shop. In fact, at the inception of the aircraft contract in 1952 when it was determined that

BOTH AIRCRAFT and vending machine parts emanate from Vendorlator's 500-ton hydro-press and 200-ton punch presses.



SIDE BY SIDE, fabrication of aircraft and vending machine parts can be found in the small punch press and press brake dept., and in most other departments.

the delivery time on a hydro-press was too far out, the tool shop in conjunction with the engineering division designed and built a 500-ton hydro-press.

Program outlined

Following is a detailed outline of the order control program. The sequence is the same for both vending machine and aircraft parts except as specifically noted for aircraft.

1. Engineering prepares and maintains a standard bill of material for all vending machine models. This B/M is used by the Purchasing Department of the Materiel Division in conjunction with the sales forecast to insure that adequate supplies of raw material and purchased parts will be on hand. The lead time on the material is frequently less than two weeks because of its availability and to conserve warehouse space.

2. The Material Planning Department of the Materiel Division prepares and maintains a standard bill of material for the aircraft operation. From this B/M requisitions are prepared and forwarded to Purchasing to cover the fabrication requirements as projected in the wing and dispenser production schedules.

3. The Manufacturing Planning Section of the Engineering Department establishes the operation sequence for each part and assembly, and prepares a reproductible master outline which is forwarded to Production Control.

4. Production Control prepares a shop order release in accordance with the master production schedule—vending machine and wing and dispenser production schedules. The shop orders are prepared to reflect the variable information: schedule start and completion, order number, and quantity.

5. Each shop order release is forwarded to Dispatching, whose responsibility it is to start the orders through the mill by the schedule start date.

6. As each job is moved into the shop, a material arrival card is filled out and forwarded to the shop superintendent's office as notice of availability.

7. As a job completes its successive operations, each machine operator fills out a move slip and places it with the shop order package on the load as a signal to Material Handling to move to the next stage.

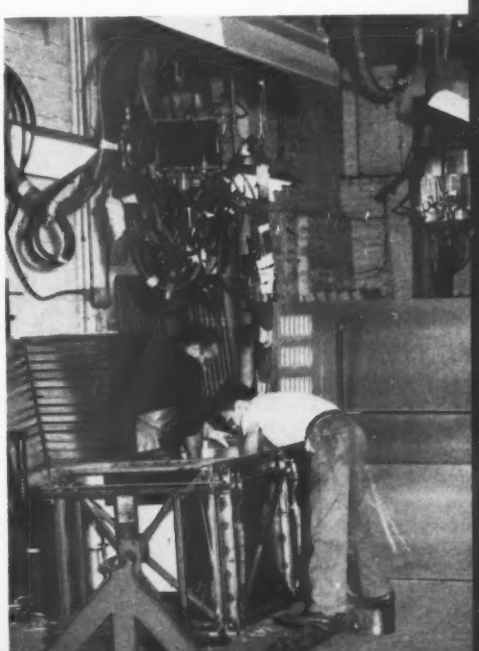
8. After moving a job to its next operation, the material handler takes the move slip to the shop superintendent's office, where it is logged. Thus that office has a record by operation of the location of every part in process in the plant.

9. After completion of the final operation, all parts are sent to a designated area for final inspection. On some extremely critical parts, both vending and aircraft, there may be intermediate inspection operations.

10. On vending machine orders, when Inspection finds the parts acceptable, the shop order is stamped off by them. On aircraft orders, all parts must be individually marked with an inspection stamp as well as the shop order.

11. Whenever parts are rejected for rework to drawing, a rework tag is attached to the lot and the job returns to the shop. If Inspection cannot make the rework decision, they prepare a rejection tag and the parts are forwarded to a salvage booth, at which point a company engineer, together with a customer and Navy representative on aircraft, determines the final disposition of the rejected parts.

All fabrication is in predetermined manufacturing lots. Detail assemblies are built in lot quantities. Major subassemblies and final assemblies are on a daily or weekly line flow.



A BATTERY of gun welders must be versatile enough to shift from manufacture of bottle vending machines to the rigid specifications demanded on aircraft parts.

GUIDED MISSILES are not essentially pilotless aircraft, although most people think so. The very absence of the pilot injects a new dominant problem—reliability.

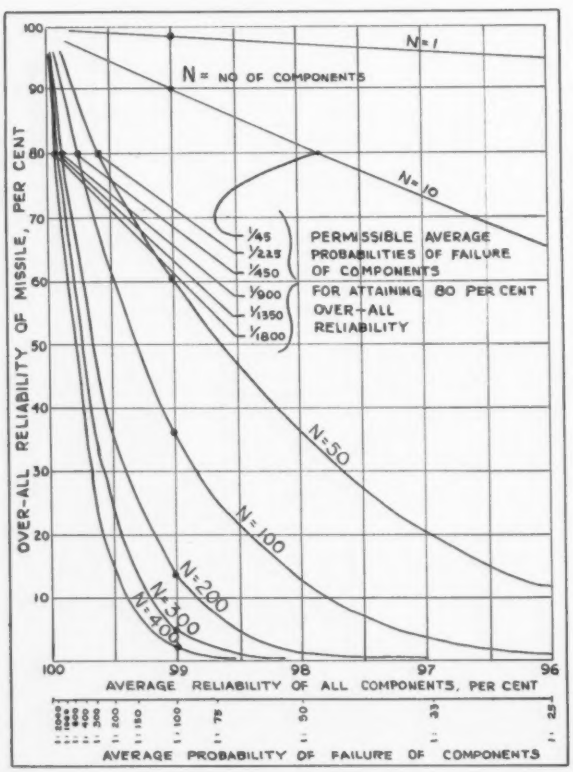
Official U. S. Army Photo

To be sure IT HITS THE MARK

. . . no component, down to the last relay, valve, or even soldered joint dare fail

Can Western missile makers meet this challenge?

TO INSURE a reasonable over-all reliability of 80%, then (if the missile has 400 components) only one out of 1,800 of each component can fail.



Will two out of three missiles fail?

IF a missile has 100 components, each with a reliability of 99% (which means one out of 100 units of each component will fail), then (by multiplying .99 times itself 100 times—i.e., 99^{100}) its over-all reliability is only 36.5%.

Will 98 out of 100 missiles fail?

IF the missile has 400 components of the same 99% reliability level, the over-all reliability would be only 2%.

Over-all reliability equals the *product*—and not the average—of the reliabilities of the individual components:

$$P \text{ over-all} = p_1 \cdot p_2 \cdot p_3 \cdots p_n$$

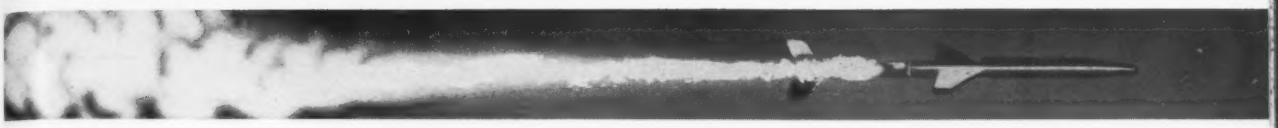
where p_1, p_2, p_3, etc., are the individual reliabilities of each of the n components.

A guided missile isn't an airplane

A 99% STANDARD may be satisfactory for piloted aircraft where the huge majority of components, numbering in the thousands, are not really vital. *For guided missiles, however, where ALL components, numbering in many hundreds or even thousands, are vital, this 99% standard is absolutely intolerable.*

Highlights of what the Southern California Section, American Rocket Society, heard from

ROBERT LUSSER
Coordinator
Guided Missile Reliability Group
Office of the Chief of Ordnance
Pasadena, California



These facts are not clearly recognized by tens of thousands of contractors, subcontractors, vendors and others directly or indirectly concerned with the design, manufacture, logistics and operation of guided missiles and their components.

Most of them still consider a guided missile to be essentially an aircraft, with the seemingly favorable exception that there is no pilot aboard and at stake. They do not realize that it is just the absence of the human pilot which has caused reliability to become the top problem of guided missiles.

Therefore their ideas regarding what level of component reliability is required are necessarily completely inadequate.

Design reliability the most critical problem

WHY designs may be weak.

A. Environmental conditions often are only vaguely or not at all known, therefore are more severe than specified or anticipated. A component may prove extremely reliable when operated in an air-conditioned room without exposure to any shock, vibration, low temperature, etc. In the climate of Alaska, however, and in front of a screaming rocket motor, it may fail immediately.

B. The "strength" of a component type invariably varies from unit to unit with respect to any given environmental condition. This variation, usually much larger than the designer suspects, is often not considered in design.

Even samples of a simple steel wire taken from the same bobbin may show a range of breaking strength of 10% the average strength. But it is not well known, or at least not appreciated, that the "strengths" of the more complex and fragile component types may easily vary 20%, 50% or even a greater percentage of the average strength value.

To determine these variations, there is no other way than to test significant numbers of units of each component type *"up-to-failure."* The strength data thus obtained will enable the prime contractor and the contracting agency to decide whether the attained safety factors comply with the specified safety factors.

C. Safety factors often specified much too leniently. Present specifications of safety factors for guided missiles are adopted from piloted aircraft, where they have been quite satisfactory, but are completely inadequate for guided missiles *because:*

These moderate safety factors of 1.15 with respect to yield and 1.5 to ultimate (breaking stresses) are specified to allow only for the natural variations of the strengths of the *materials*.

Design load factor

In piloted aircraft, however, the "design load factor" is an additional and very powerful safeguard against breakage, e.g., a load factor of four is specified for commercial airplanes to protect against vertical overloads caused by over-control and gusts. Thus the combined safety factor (of the wing, for example) is $4 \cdot 1.5 = 6$.

But the actual loads in service of an airliner are not four times the weight of the plane, because pilots are trained to control their ships so smoothly that they rarely exceed a load of more than half again the acceleration of gravity. Even in very bumpy weather the pilot can prevent vertical loads which exceed 2_g. Thus even under extreme conditions we enjoy a comfortable safety factor of three.

Guided missiles, on the other hand, do not sense the stresses and exceed the many critical limits of their components without hesitation. Even more important, the level of component reliability must be extremely high, which would necessitate another considerable increase of safety factors.

Manufacturing reliability

EVEN 100% inspection is not enough, because defects in guided missile components are often too subtle to be detected. In addition, inspection is only a hindsight measure. Full-fledged statistical quality control has both hindsight and foresight, because it helps to improve the manufacturing *process*.

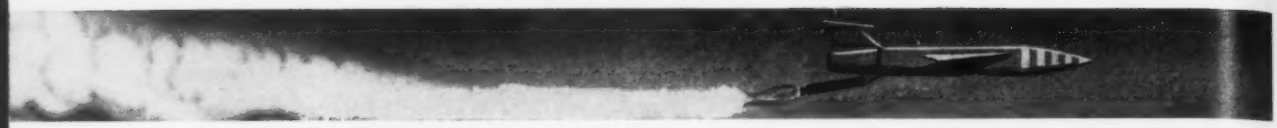
The usual yardsticks of "economy" in statistical quality control must be revised, since a $100,000 missile can be totally lost because of the failure of a 10¢ component or part.

What is "very reliable"? One defective in 10,000

WOULD YOU SAY that one failure in 5,000 is "very" reliable? Some time ago I visited a manufacturer of electronic harnesses for a guided missile. The inspector didn't know what his rate of defective soldered joints was, but readily agreed that he would be pleased with a rate of one undetectable

IN AN AIR-CONDITIONED ROOM without exposure to shock, vibration, temperature, a component may be extremely reliable. But in Alaskan winters, or in front of a screaming rocket motor, it may fail immediately.

Official U. S. Navy Photo



cold soldered joint out of 5,000.

When I explained to him that this particular missile contained about 5,000 soldered joints, and that therefore this failure rate of 1:5,000 would cause the failure of 63% of all missiles, he was startled. He explained that no one had ever told him that with these particular joints he should strive for a rate of defectives of, say 1:100,000, or better, 1:1,000,000, and expressed a strong desire to learn more about reliability control and statistical quality control.

The designer must strive for a degree of design reliability such that a malfunction is not likely to occur in more than one unit out of 10,000, or even better.

This means that:

A container should never burst or leak.

The servo oil should never be consumed before intercept.

The torque of a servo should always be strong enough to active the rudder.

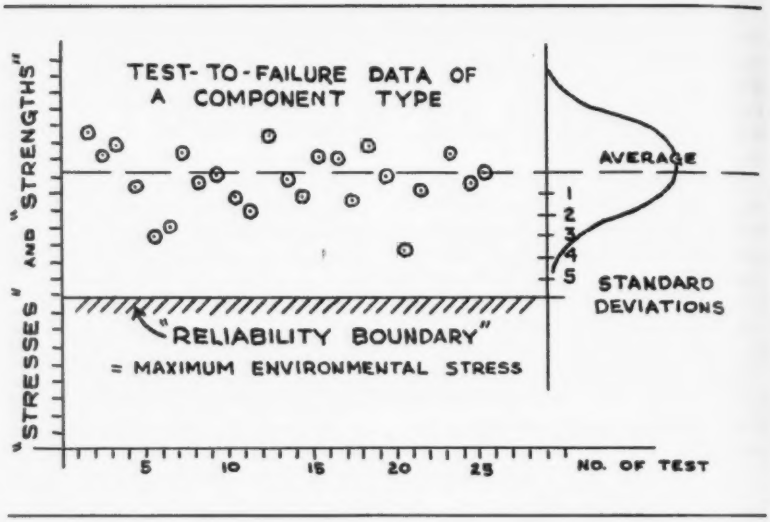
A vacuum tube should never fail.

None of the thousands of soldered joints should ever fail.

No carrier frequency should ever deviate beyond tolerable limits.

Test-to-failure remedy

SYSTEMATIC TESTING up-to-failure, in statistically significant numbers, with increasing severities of environmental conditions and design criteria.



The data of "ultimate strengths" can be easily plotted in the accompanying chart. The width of the scatterbands varies enormously, depending on the type of component and environmental condition. This creates great uncertainty as to whether a component is reliable or not, therefore the designer must not only know the "average strength," but the width of the scatterband expressed in standard deviations. There is virtually no other way to find whether or not a component type is intrinsically reliable.

The test-to-failure method will provide a rational basis for specifying that a certain minimum number of standard deviations, say five, shall be available between the average value and the so-called "reliability boundary" (the specified maximum value of an environmental condition).

Its great economic advantage is that the number of tests-to-failure required is very small compared to the huge number required when the reliability of the component is to be obtained from tests under the severity of the actual conditions only. In the former, we might need five to 20 tests; in the latter, possibly several thousand.

The most important advantage is that defects and malfunctions can be studied at close range and traced to their ultimate cause, leading to quick and accurate remedies and improvements.

If the first unit so tested turns out to be, say four times stronger than the maximum condition required in service, it is generally not necessary to test any more units, because this usually practically eliminates any danger that any subsequent unit may be weaker than the maximum service condition.

In all instances where the first unit reveals a safety factor of less than four, one must determine the "natural" variations of the strength from unit to unit, and more units must be tested up-to-failure until statistical proof is obtained that a safety margin of, say, at least five standard deviations is attained.

Reliability test program

A reliability test program should first of all deal with the hundreds of standardized components and parts, such as valves, relays, vacuum tubes and even soldered joints.

These are ordinarily selected from catalogs without any knowledge of what conditions they can really stand or whether adequate safety factors and margins exist.

Four principles to lick present inertia

1. The presently specified environmental conditions, limiting test values, and safety factors cannot be trusted.

2. Environmental conditions must be carefully determined, on a statistical basis, by actual tests.

3. Unusually high safety factors, which insure virtually "absolute" design reliability, must be specified and applied.

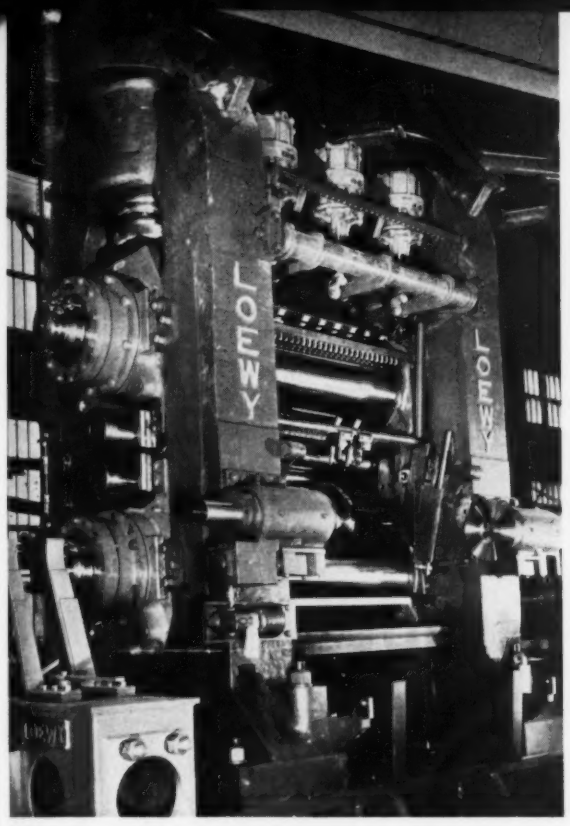
4. The existence of these high safety factors must be proved by testing significant numbers of units up-to-failure.

How do we get *real* reliability?

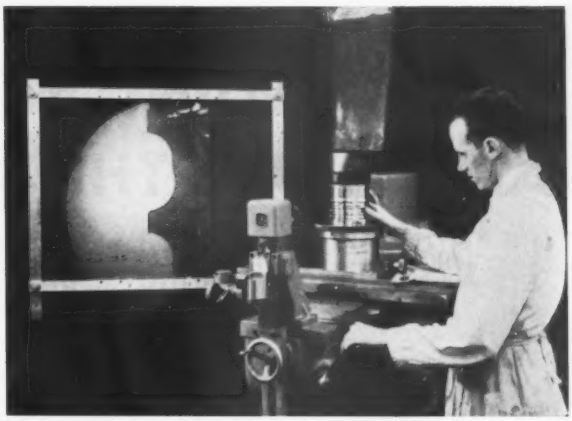
1. Keep number of components low.

2. Raise component reliability level far above that required in virtually all other fields.

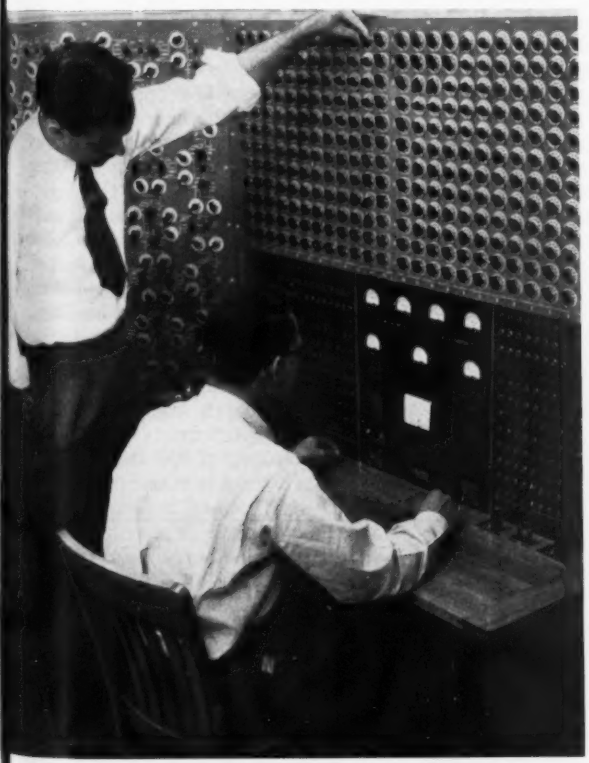
WESTERN PROCESSES AND PRODUCTS in Today's View



A NEW 60-IN. four-high aluminum foil rolling mill is being installed at the Kaiser Aluminum & Chemical Corp. foil plant at Permanente, Calif. New mill, to handle foil to a width of 54 in., is expected to be completed by mid-year.

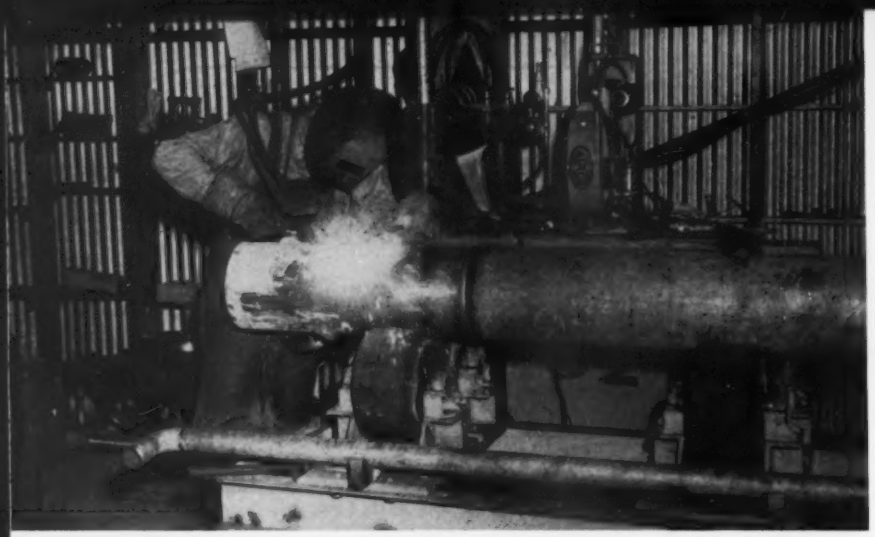


SHANK AND BORE DIMENSIONS of an aircraft propeller are checked in this optical comparer at the Dodge San Leandro, Calif., plant of Chrysler Corp. Outline on the screen is the magnified image of a machined raceway for prop ball bearings.



HUNDREDS OF SWITCHES and circuits make up this analogue computer being used by General Electric engineers at Hanford, Wash., plutonium producing plant to study atomic reactor heat flow problems too time consuming for analytical solution.

FIRST MATERIAL being charged into Chicago Bridge & Iron Co.'s new stress-relieving furnace at its Salt Lake City, Utah, plant. Inside dimensions are 12 x 12 x 35 ft. long. It can stress-relieve vessels to 10 ft. in diameter x 60 ft.



LEFT: Operator manually welds the small supporting lugs and piping to the main tube. In foreground is tubing which fits inside the cylinder.

RIGHT: Welding required on single cylinder assembly. For outer shell one 5/16-in. fillet weld, one butt weld. Plunger assembly, one 5/16-in. fillet weld, two standard butt welds, one bronze build-up 3/16 x 1 in., one special butt weld joining plunger body to 2-in. thick interior supporting ring, also joins guide ring to a supporting ring.

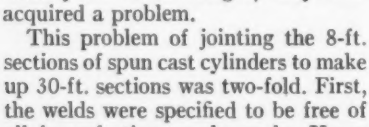
NEW WELDING TECHNIQUES APPLIED IN THE WEST...

. . . Problem of jointing spun cast stainless steel cylinders solved by Portland fabricator

By W. L. WYMAN
Process Representative
Air Reduction Pacific Co.
Portland, Ore.

WHEN THE Cascade Manufacturing Co. of Portland, Ore., obtained a job of welding a large number of Type 310 stainless steel spun cast cylinders to make up units approximately 30 ft. in length, they also acquired a problem.

This problem of jointing the 8-ft. sections of spun cast cylinders to make up 30-ft. sections was two-fold. First, the welds were specified to be free of all imperfection as shown by X-ray and also by visual inspection. Second, minimum welding cost consistent with this high quality was essential.



JOINT DESIGN in ⅝-in. Type 310 stainless steel.

These considerations dictated the use of the inert gas arc consumable electrode process. The cylinders were 9 in. OD, and ⅝ in. wall thickness. The design of the joint, which was welded with a manual Aircomatic unit mounted on a post, is shown in one of the accompanying illustrations.

By removing the gun from the mounting post, the operator manually welded the small supporting lugs and the piping to the main tube. The 2½-in. OD tubing with 5/16-in. wall fitted inside the 9-in. OD cylinder and is made up with the welding unit in much the same way as the larger cylinder.

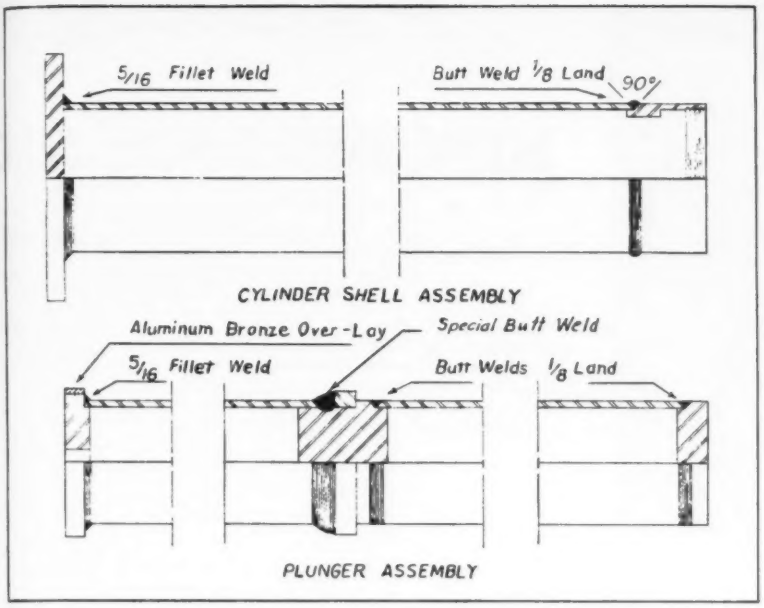
The welding requirements were of the highest order. The penetration on the butt joints was specified to be 100%, and the inside of the tube required an inside reinforcement of at least 1/16 in., but not more than ⅛ in. Since back-up could not be used, the result was obtained by a very critical amperage, wire-feed and travel speed control. The welding operators were very careful to hold the specified welding conditions, and no difficulty was encountered in consistently getting these results.

On the 9-in. OD tubing the first pass welding speed was 27 in. per min., and the second pass speed was 13 in. per min. at a current of 285 amp. supplied by a DC motor generator set. The inert gas used was a 2% oxy-argon mixture at a flow of 60 cu. ft. per hr. and 1/16 in. Type A310 wire was used. These conditions gave a completed joint speed of 9 in. per min.

Approximately 2,000 lb. of A310

Welding conditions

Weld	Passes	Speed, IPM	Wire	Inert gas	Current, amperes
5/16 Fillet	1	21	1/16 A650	2% Oxy-argon 50 cu. ft. per hr.	285
5/16 Wall butt joint 90° vee, ⅛ land	1 2	20 12	1/16 A650	2% Oxy-argon 50 cu. ft. per hr.	285
Special butt joint as shown in figure	1 2 3	15 12 12	1/16 A650	2% Oxy-argon 50 cu. ft. per hr.	285
Aluminum bronze overlay	2 layer 3 pass	15 per pass	1/16 A158	Pure argon 50 cu. ft. per hr.	225



was used for this job. Because the application was so successful, Cascade became interested in welding SAE 1015 steel hydraulic cylinders, which is the major fabricating operation.

Several factors point to the inert gas arc consumable electrode process as the answer to most of the problems encountered in the welding of these cylinders. One requirement is a large volume output for a limited floor space. This is accomplished by the high speed of welding with this process.

Minimum handling

Another requirement is a minimum of handling. The welding method, which requires no clean-up, eliminates several handling operations. Also, because all welding can be done in one jig at one location, a materials flow route can be set so that the work moves progressively through the shop. Finally, since each of these completed hydraulic cylinders is hydrostatically tested at 2,600 psi., the welds must be of uniformly high quality.

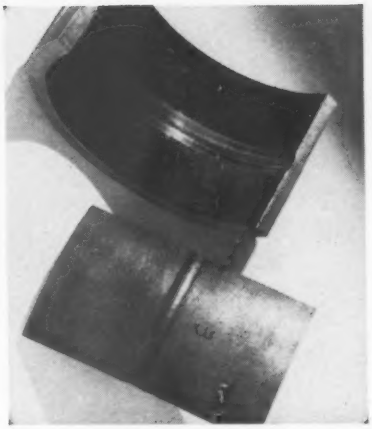
After several trial units were made up and found to be satisfactory, this method of welding was adopted as a standard production operation. When the steel welding operation was well established, Cascade bought automatic equipment to replace manual models.

Although several different lengths and diameters of from 3 to 8 in. are produced, the previous welding joints cover all types of cylinders. They are made of SAE 1015 cold finished seamless tubing.

The two pass operation on the butt joint was found to be necessary for two reasons. First, the penetration was much easier to control. Secondly, the two pass operation reduces the weld porosity.

It appears that the pool is not completely deoxidized and some of the gases are trapped. By running a second pass the metal has a chance to give up the entrapped gas. Tests are now being conducted with the new A675 wire, and it appears that porosity will no longer be a problem, so in the future a single pass will complete the joint in most cases.

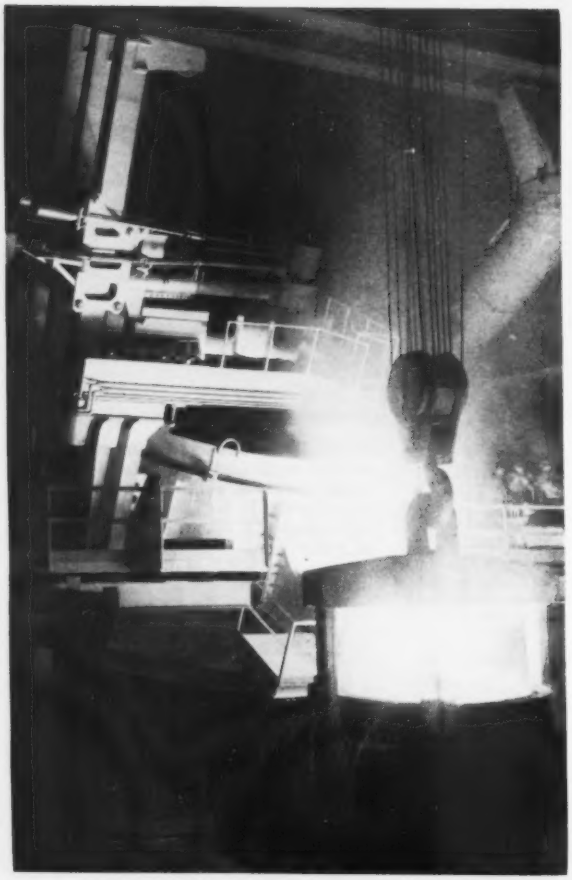
Inspection and approval of the welding was established in two ways. First, the welds were X-rayed and tested to destruction to be sure that the welding was of the very high quality required in this application. Second, each completed cylinder is hydrostatically tested at 2,600 psi.



RESULTS of runs shown (above) by as-welded finish and back side of weld. The wide range of cylinders manufactured is indicated in the picture below. Some are completed, others in different stages of production.

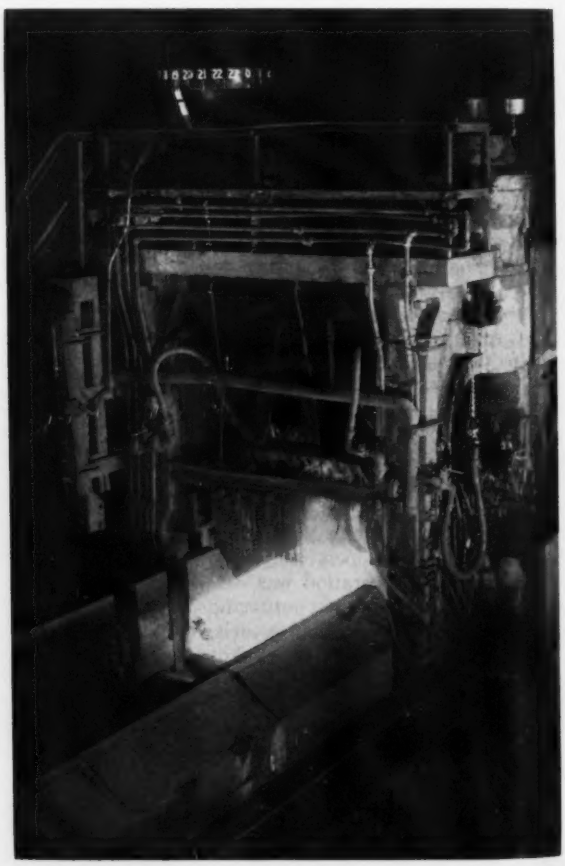
BELOW: Hydraulic cylinder department with completed cylinders in background. Cylinders in foreground are to be welded. Complete welding layout can be seen along left side. Pressure testing is done in back of welding location, in the vertical testing jigs next to the stairs. By very close shop control, a vastly superior product has been made possible.

NEW MILLS FOR OLD



ELECTRIC-ARC FURNACE pours 85 tons in one heat. Mill products include various structurals, hot rolled strip, special rolled sections, wire rods, fense posts, bolts, nuts, rivets, and varieties of wire.

FIRST ROLLING OPERATION of a 4½-ton ingot begins its first pass through the 32-in. mill. Heated to correct uniform rolling temperature, the ingot passes through several rolling stages to bloom and billet.



LOOKING THE SCENE OVER are (from left): R. J. Tremblay, general superintendent; H. H. Fuller, president; W. J. McClung, vice-president. Furnace in background.

HELP THE WEST...

Bethlehem Pacific Coast Steel develops up-to-date facilities

ANOTHER exemplification of the West's steady and sound industrial growth is Bethlehem Pacific Coast Steel Corporation's new Los Angeles mill, shown in the accompanying pictures.

In 1945 Bethlehem found that its Los Angeles facilities would be inadequate to keep pace with the West's development, so an expansion and modernization program was begun in 1946 which now has given Bethlehem in effect an entirely new steel mill.

Three open hearth furnaces were dismantled and removed, and replaced by the West's three largest electric furnaces, increasing capacity from 100,000 tons of ingots annually to over 400,000 tons.

A late model high speed bar and rod mill was added.

The billet mill was rebuilt and mechanized.

A wire mill, the only one in the Pacific Southwest, was installed.

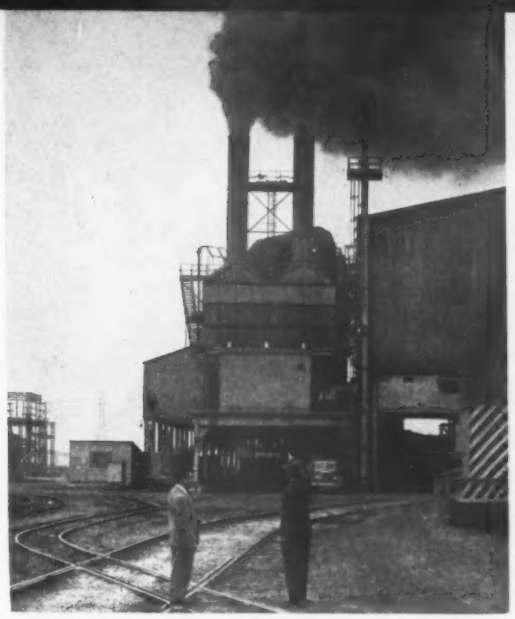
Larger steel scrap storage and handling areas were added, plus new equipment for handling.

Besides the steel-making facilities the bolt and nut making operations have been revamped and expanded with new production machinery. Reinforcing bar facilities have been moved to another building.

Bethlehem Pacific at Los Angeles is now self-sufficient in nuts, bolts, rivets and specialties, the Southern California area no longer having to draw on the South San Francisco plant or the East.

A new blooming mill and soaking pits for heating the larger ingots are other features. The new spectrographic laboratory includes equpiment which will chemically analyze steel in less than two minutes. Galvanizing equipment is to be added this fall.

The first successful air pollution control equipment ever installed on large electric furnaces is something of which Bethlehem is particularly proud.



DUST AND FUME control typified in these two pictures. Top shows amount of contamination thrown in the air without control.

HERE IS what the Cottrell precipitator does to the smoke and fumes. First of its kind for steel furnaces like this.

MECHANICAL cooling bed for the 12-in. mill. Rolled steel products are automatically moved to the delivery side at right.

SKYLIGHTING with plastic offers safer, leakproof installation.

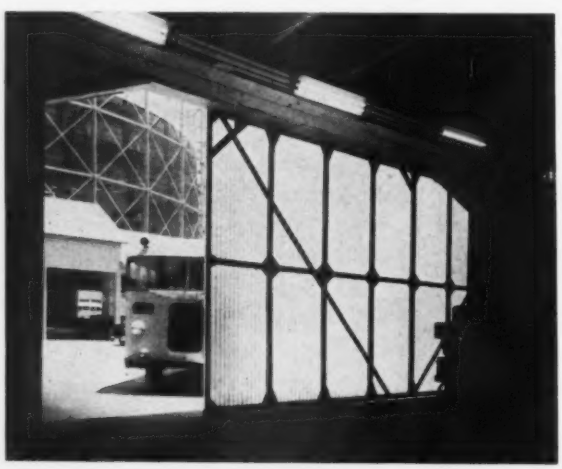
PLANT LIGHTING with PLASTIC PANELS

Corrugated, translucent material offers wide range of uses, easier installation, safety

USE OF translucent, shatterproof, corrugated plastic panels for sidelights and skylights has brought about a great reduction in the cost of industrial skylight glazing, and consequently in the cost of fabricated steel buildings.

The cost problem that formerly existed was caused not so much by the price of glass as by the expense of providing framing. Steel sash was costly, sometimes hard to obtain, and required special skilled labor for installation. In addition, a waterproof installation could not be assured and leakage was a common problem.

All of these problems, as well as the major one of cost, have been solved



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PERHAPS YOU, TOO, CAN MAKE A BETTER PRODUCT WITH REVERE EXTRUDED SHAPES

This new Oxy-Acetylene welding torch is notable for the use of Revere Extruded Shapes in free-cutting brass—and also for its light weight, good balance, and easy handling. The connection for the gas tubes is machined from a shape, and silver-brazed to the fluted handle, also a shape, which is in turn brazed to a shape that contains the needle valve controls. Another fluted shape is the mixer, and the same shape is also the source of the next part, which is a second mixer. Another shape forms the nut which attaches the nozzle to the assembly. The nozzle, by the way, is made of Revere Free-Cutting Copper Rod, which is upset, drilled, swaged to size, and then chrome plated. The manufacturer of this new torch came to Revere to learn about the possibilities of extruded shapes.

If you have a product whose design includes a part or parts calling for extensive machining along the longitudinal axis, such as flutings, curves, recesses, remember Revere Extruded Shapes. They can greatly reduce machining time, lessen scrap, lower production costs, and speed up output. See the nearest Revere Sales Office.

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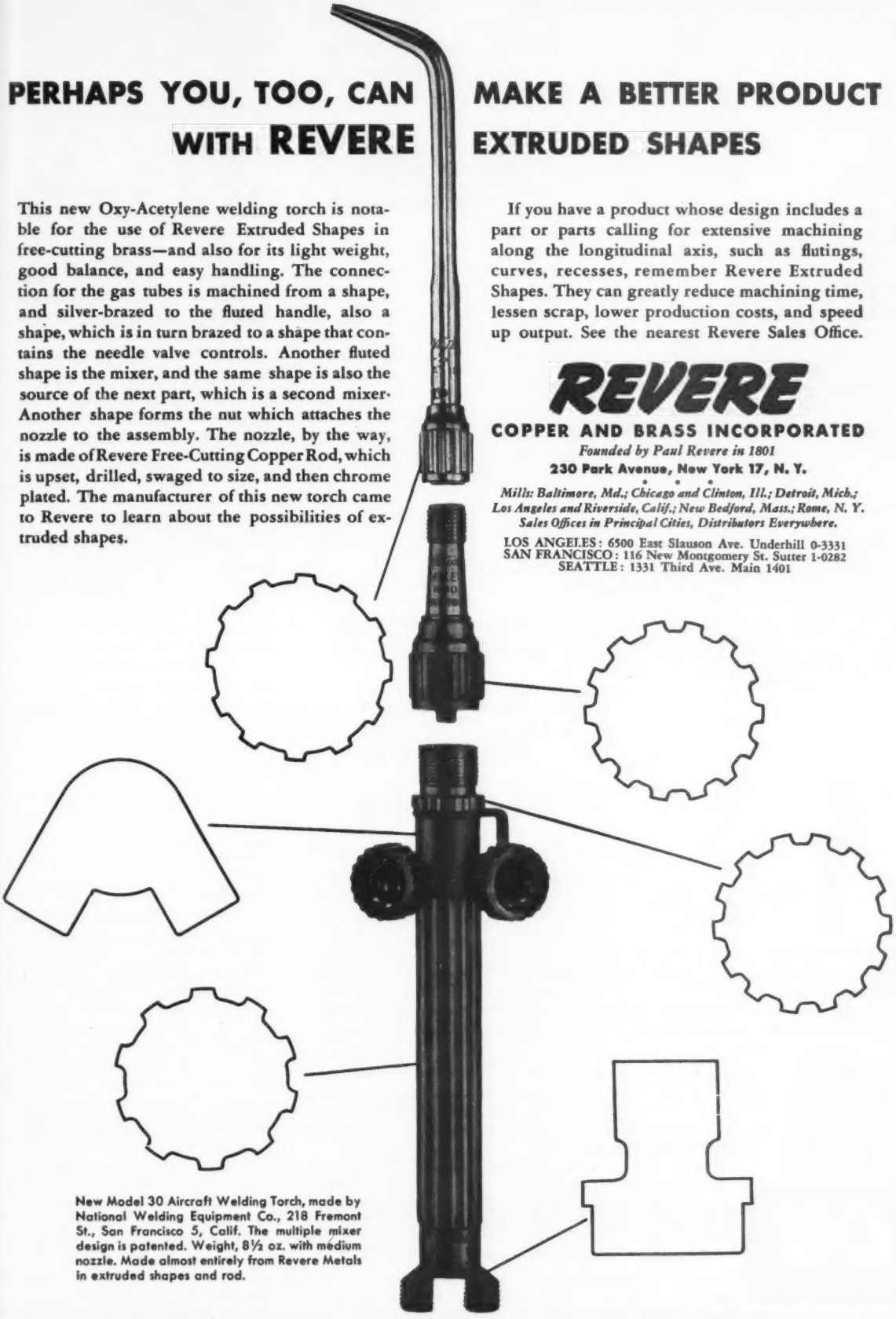

New Model 30 Aircraft Welding Torch, made by National Welding Equipment Co., 218 Fremont St., San Francisco 5, Calif. The multiple mixer design is patented. Weight, 8½ oz. with medium nozzle. Made almost entirely from Revere Metals in extruded shapes and rod.

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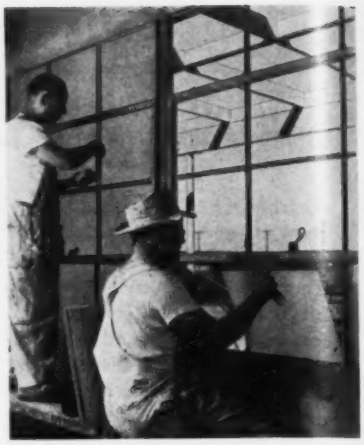


SHATTERPROOF PLASTIC panels make for easy and inexpensive installation.

by the use of the corrugated building panels mentioned above. Made of glass fiber reinforced polyester resin material, they are shatterproof—invulnerable to hail, vibration and even rocks thrown by mischievous boys.

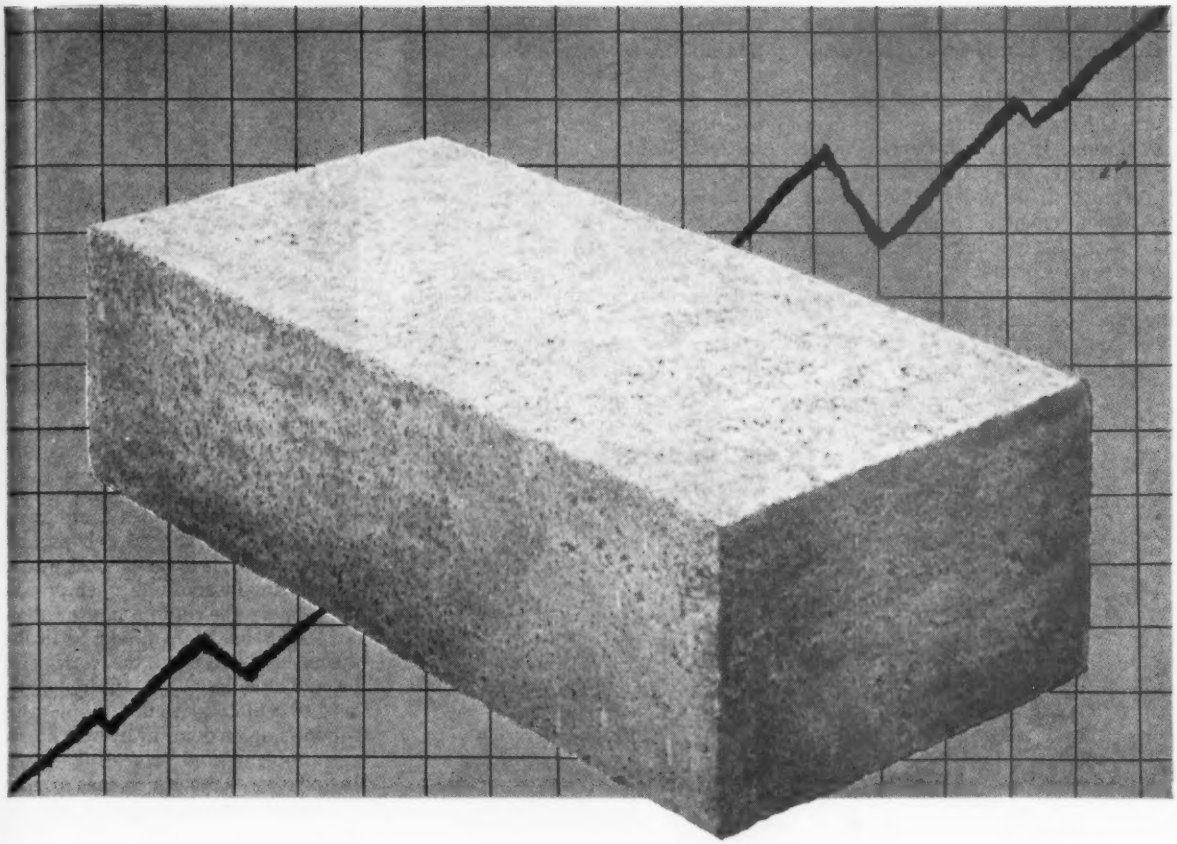
A typical installation is seen in the 22 corrugated steel warehouse buildings of Calcot Limited Company, Bakersfield, Calif., which house the equipment that compresses and bales for storage the cotton of the 3,000 members of this San Joaquin Valley cooperative market association. Installation of Plexolite panels, from Plexolite Distributing Co., Los Angeles, for the 900 skylights effected a saving of $100 to $150 apiece, or a total saving of over $100,000.

Such savings are made possible because the corrugated sheets nest perfectly with other corrugated materials such as steel, aluminum or Transite, and thereby do away with the need for framing.

Another interesting story is from the Stauffer Chemical Co., Torrance, who removed the conventional sash and glass from their fabricated steel building and substituted plastic paneling. In the case of Stauffer Chemical, the problem was two-fold: breakage of glass was proving costly, and the metal sashes were deteriorating. Both problems were solved—permanently. There was also a "plus" value, the reduction of glare through the use of a translucent rather than transparent covering that transmits only a soft, diffused light.

Use of corrugated plastic panels also adds a safety factor in industrial installations, removing the danger of flying splinters of glass in cases of explosion or sudden impact. This factor alone has caused many safety engineers to use the material.

A packing house not only installed



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PCA, PCA-MC (Periclase-Chrome "A"), plain and metal-encased for open hearth end walls, front walls and uptakes. Metal-encased for electric furnace sidewalls. High in MgO. Outstanding all-purpose refractory.

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skylights of the material but also used it as a splash-guard because of its acid-resistant properties.

Thus far, the industrial uses described have been entirely in the field of glazing. In other instances, however, entire walls have been constructed of it, in order to obtain the maximum amount of interior light. One such case is found in the shops of the Crown Coach Co., Los Angeles, builders of large busses, who used plastic panels for the huge sliding doors of their various shops.

When bad weather makes it necessary to close the doors, there is no appreciable loss of light in the interior of the shops. According to the workmen, the light-diffusing properties of the material seem to provide a better light, with less shadows, than when the doors are open.

A similar use is found in the portable oil well drill rigs built by Wagner-Morehouse, Inc., Los Angeles, for use in the Canadian Rockies. Plastic panels were used for all the walls, roofs and even the doors, providing shelter against the winter and admitting a maximum amount of light at the same time. Plastic panels met another requirement of Wagner-Morehouse, being light enough to be handled by one man during dismantling when preparing to move the rig to a new location.

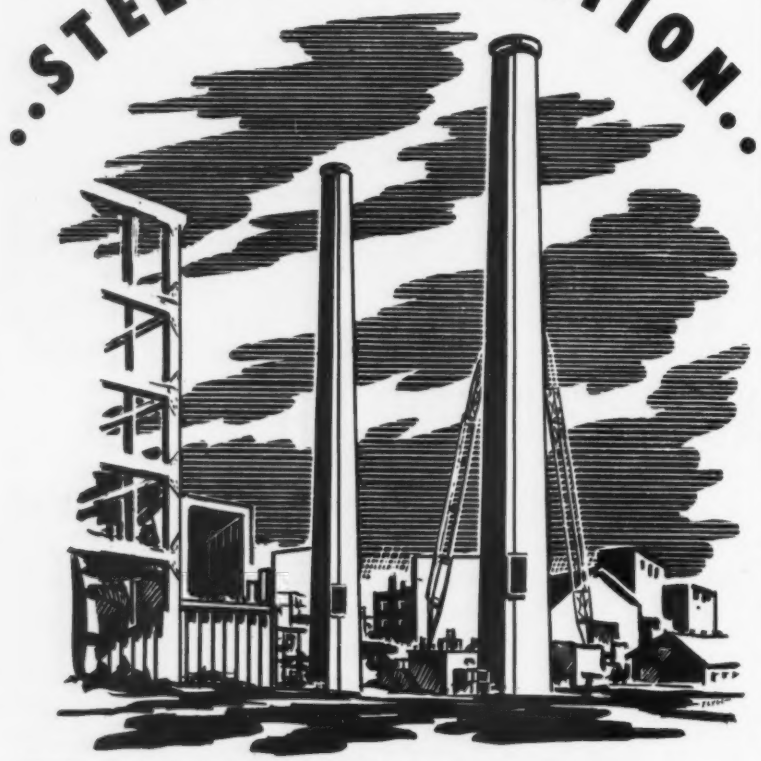
TRANSLUCENT PLASTIC windows offer diffused light and color.

Plastic panels are produced in flat sheets, as well as in the corrugated form. These flat sheets are frequently used to replace glass in multiple-pane windows, again doing away with breakage problems and increasing safety. Installation is much like that of glass but usually proceeds faster because there is no danger of breakage during work.

Whether the flat or corrugated panels are used, installation is simplified by the fact that the material can be sawed, drilled and nailed with ordinary tools. A simple and speedy application of mastic is utilized to provide a 100% waterproof seal. Mastic and other accessories such as neoprene washers, rust-proof nails and corrugated mouldings are available from dealers, along with complete installation data.

Shatterproof translucent panels usually find their way into the offices of industry as well as the factories, since they provide colorful light-passing partitions that are light in weight, easy to construct and easy to move. They are especially valuable when used as walls or partitions for offices located right in the shops, for foremen, department managers and inspectors.

In selecting the color for an industrial application, careful consideration should be given to the amount of light desired. According to the color selected, as much as 85% of the light can be admitted—or as little as 15%—and almost any desired percentage between 85% and 15% may be obtained. Plexolite, for example, stops approximately 50% of the heat that is transmitted by glass, admit ultraviolet light, but is successful in keeping infra-red rays out.



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The coefficient of thermal expansion of plexolite, one of these plastic materials, is about the same as aluminum, or 1.6 x 10^{-5} in./in./deg. F. The material is shatterproof, with an impact strength of approximately 20 foot-pounds per inch of notch by the Izod impact test method. It resists vibration and shock and will not shatter when struck by falling objects, rocks and other industrial hazards. Falling embers, cigarettes, sparks or such will not ignite it. It is very difficult to catch fire under any conditions, and it will not burst into open flame until the temperature of the material has been raised to approximately 850 deg.

It is resistant to mild acids, salt water and other such common corrosives. Tests equivalent to many years of actual exposure show no appreciable change in color, or other breaking down of material.

AUTOMATIC CONTROL

Computer conference shows its rapid development

TWO MAJOR developments are indicated by a review of the second Joint Western Computer Conference in Los Angeles in February. First, the completely automatic control of industrial machines and processes has passed from the realm of the dreamer and the science fiction writer into the realm of the development engineer, and such application of digital computers will come into considerable use in the next few years.

Second, the designer of digital computers is becoming increasingly aware of the problems facing today's business man, and is developing machines which will fit smoothly into a management system and provide a high speed, accurate and economical method of handling the routine kinds of paper work.

Papers presented at the conference demonstrated some results of a trend which has been developing in this field during the last two years. The machines and techniques described represented a shift in emphasis from equipment intended for use in the field of scientific computing to equipment for use in business and industrial control applications.

Since it is a major problem in the application of digital computers to industrial control, a relatively large number of papers were devoted to methods of converting input data from analogue form to digital, and output data from digital to analogue form.

The most striking information to

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come out of this section of the conference is that there are satisfactory methods available and that a digital computing system is in actual use controlling machine tools used in fabrication of the turbine and compressor types of blades.

Another application of digital computers in this field which appears to be successful is the use of airborne digital computers to control all the operations of an aircraft as well as to perform the calculations necessary for navigation.

Efficiency sacrificed

In the field of business and management application, the papers presented indicated a tendency on the part of today's designers to sacrifice the versatility of the so-called general purpose machine in order to provide a machine which is able to perform the normal operations of accounting, inventory control and associated calculations in the most efficient manner.

Such a machine is highly desirable in industries with sufficient accounting load to make full use of its time; however, the sacrifice of versatility precludes use of the same computer for both accounting and engineering design applications. Therefore, it would seem that management of the smaller companies would still prefer the more general type machine.

INSTITUTE PROGRAM Packaging and Materials Handling Conference

PANEL CHAIRMEN and topics for the third biennial Packaging and Materials Handling Institute at the University of Southern California, Los Angeles, June 8 and 9, are as follows:

1. Analysis of Handling Problems and Selection of Materials Handling Equipment. Chairman, James P. Kinney of the James P. Kinney Company.

2. Bulk Handling. Chairman, Frank Reed, Assistant Manager, Freight Protection, Southern Pacific Company.

3. Handling Raw Materials and Parts in Process. Chairman, Robert Phoenix, Senior Industrial Engineer, Materials Handling, McCulloch Motors Corporation.

4. Shipping of Parts and Materials between Plants, Vendors, and Customers (Manufacturing). Chairman, Clint Umphress, North American Aviation, Incorporated, Los Angeles plant.

5. Distribution and Warehousing. Chairman, Harlan Nissen, Terminal Refrigeration Company.

6. Preventive Maintenance and Replacement of Materials Handling Equipment. Chairman, Wallace Fore, Assistant Plant Engineer, North American Aviation, Incorporated, Los Angeles plant.

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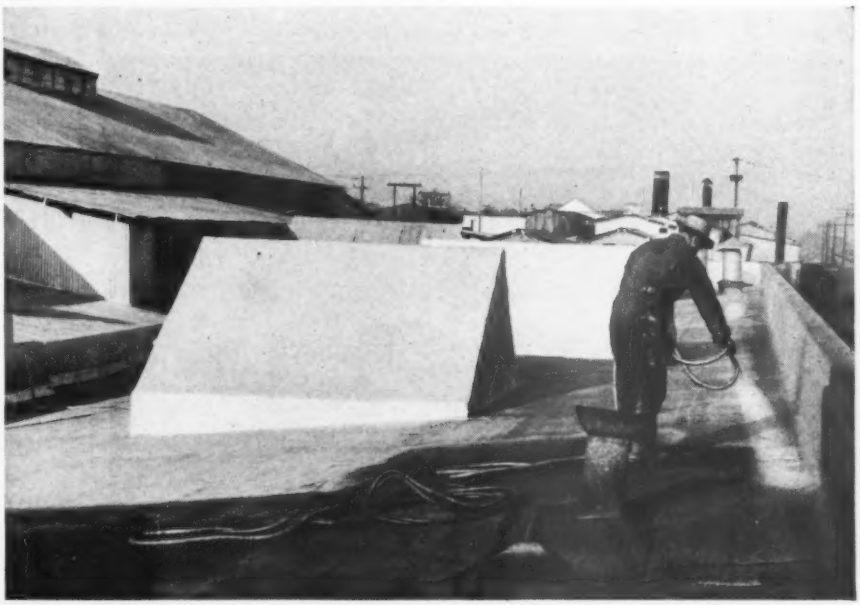
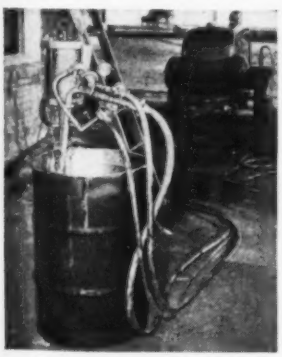
FIRM *Empire Construction Co., Sacramento, Calif.*

Special coating stops all roof leaks for first time!

WHEN STANDARD ALUMINUM ASBESTOS COATING was sprayed on these prepared-paper and corrugated iron roofs, it made them completely weatherproof for the first time in 15 years! From the first, roofs leaked in new places each winter, despite patching and repairing. Since coating was applied no sign of a leak has appeared through a heavy rainy season. 2½ gallons to 100 square feet were used because of roofs' bad condition. 2 gallons per square were used on walls. On the corrugated metal roof, a light film of Standard Aluminum Asbestos Coating was first sprayed on after sweeping. Next, glass fabric was spread and brushed down smooth while coating was still wet. Then, a final coat was sprayed on.





THIS PUMP AND COMPRESSOR were used by the appliers, Empire Construction Co., Sacramento, Calif., to handle the Standard Aluminum Asbestos Coating without thinning or heating. They use the complete line of Standard Roof Coatings to protect all types of roofs and walls. In years of use, they've found them easy to apply and always of uniformly high quality.

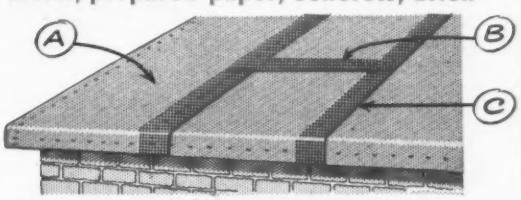
FREE FOLDER tells you more about Standard Roof Coatings and how to use them. Write or ask for it today.

FOR EXPERT HELP on reconditioning roofs or other surfaces, on lubrication or fuel problems, call your Standard representative; or write 225 Bush St., San Francisco.

STANDARD

TRADEMARK "STANDARD" REG. U.S. PAT. OFF.

How Standard Roof Coatings weatherproof metal, prepared-paper, concrete, brick



A. Form resilient "blanket" over entire surface...wide expansion and contraction range prevents cracking. Insulate and deaden sound. Aluminum types reflect sun — reduce interior temperatures as much as 10°F. in hot summer weather.

B. Adhere firmly to all surfaces...remain pliable. Economical—cover well.

C. Flow freely into seams, cracks, nail holes—form tight seal. May be sprayed, brushed, or applied with squeegee.

STANDARD OIL COMPANY OF CALIFORNIA

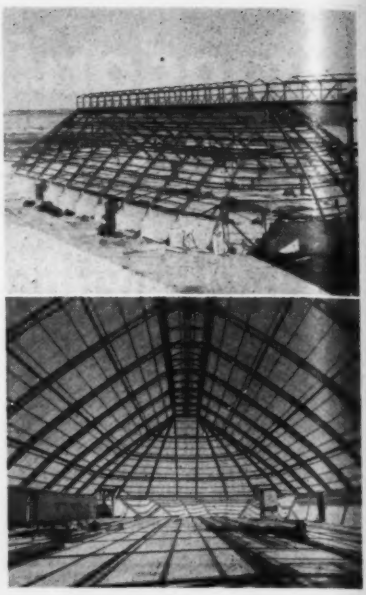
BATTLE OF THE BULGE

Great Western Sugar wins it with arch rib construction

WHERE BULK storage is involved, pressure against the walls is often a difficult construction problem to solve. Great Western Sugar Company found the answer at Fort Morgan, Colorado, in working with an arch rib type construction.

This building, used for the storage of bulk pulp and pellets, was designed to withstand pressure from pellets weighing 45 lb. per cubic foot. Concrete walls, 10 ft. high, form the sides and rounded ends, which provides efficient and uniform storage in all areas of the building.

Floor area is approximately 21,000 sq. ft., width is 102 ft., and there are nine bays 20 ft. in length, with 45-ft. radius on the ends. The arch ribs are 47 ft., 10 in. in height, providing a storage capacity for about 10,000 tons of pellets. Roofing and siding on the warehouse is made of corrugated sheet metal.



EXTERIOR VIEW shows concrete walls, with arched ribs above. Monitor on top houses conveyors and walkway. Interior scene indicates full storage use of space.

Two belt conveyors, with a walkway between, run full length of the monitor. Trippers are used to discharge the pulp and pellets at any point along the building.

To enter

Ten doors provide access to the building, five of them being 12 x 14 ft. to facilitate bulk pulp loading of trucks. Pellets are returned to a floor level hopper at one end of the building and are carried by belt conveyor and elevator to a storage bin for truck loading.

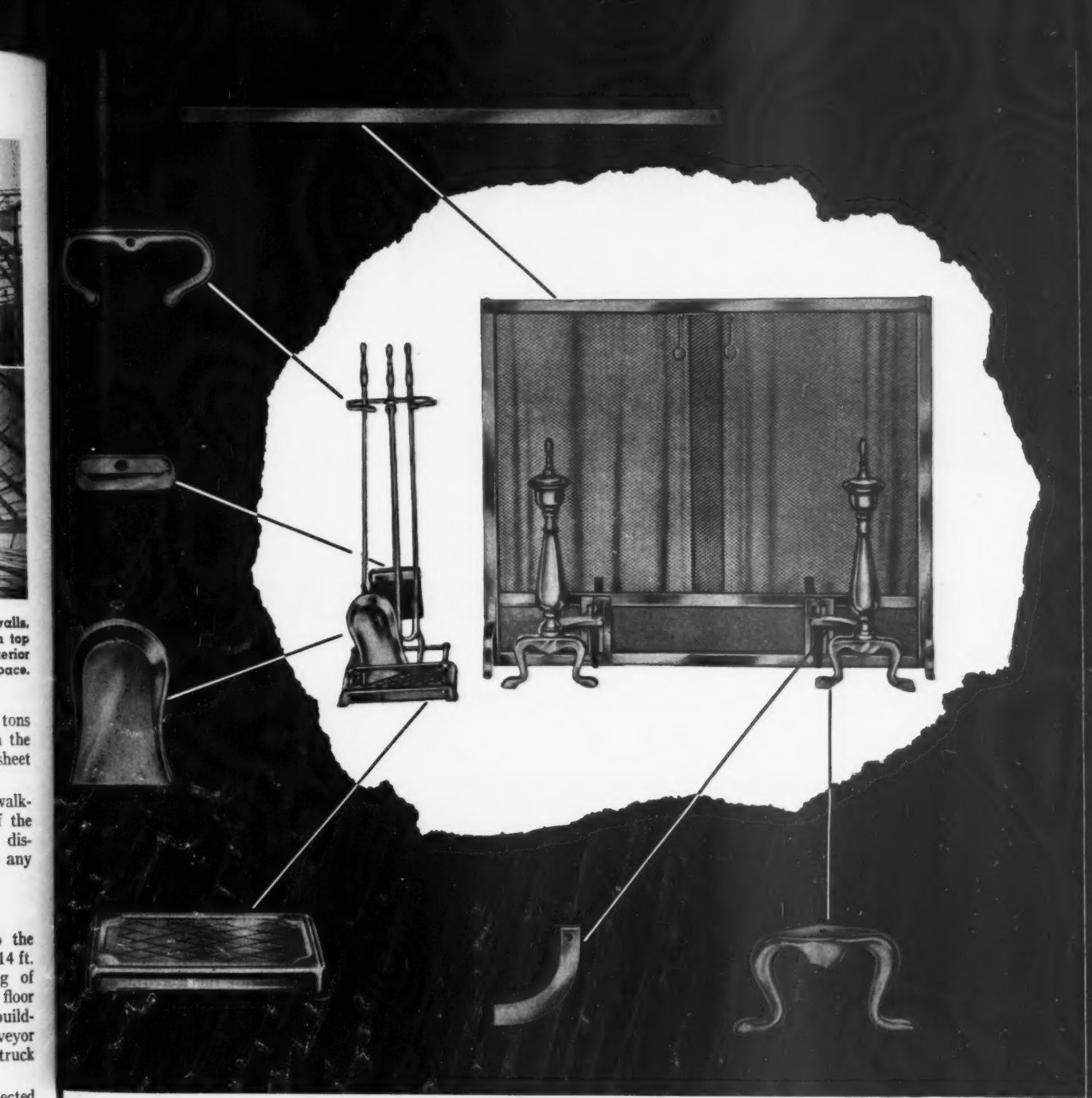
Each of the large doors is protected from material loads by a movable bulkhead. These units allow immediate loading of pellets from the outside before they are moved away from the doorway.

Lighting in the building is provided by portable flood lights and fire protection by a dry booth sprinkler system.

CORRECTION . . .

. . . AN ADVERTISEMENT of Chase Brass & Copper which appeared in the March issue of *Western Industry* inadvertently carried their former Los Angeles address instead of the new location at 6500 East Washington Blvd., Los Angeles.

Machine Work or
Gear Production
PRECISION IS THE WATCHWORD AT ADVANCE
No matter what the assignment . . . tooling, machine work or the production of intricate gears . . . *precision* is the most important factor at ADVANCE. Our facilities and experience enable us to do all types of machine work or produce any kind of gear, gear product or gear assembly that your specifications may require. Each phase of production is carefully inspected and every detail of manufacturing is closely checked to make sure that each job is precision engineered.
Write today for a copy of our informative brochure "Gears and Gear Products"
Advance
Gear & Machine Corp.
5851 Holmes Avenue • Los Angeles 1, California



FORMBRITE'S SUPERFINE grain structure enables Special Products Co. to buff this equipment in half the time necessary with ordinary brasses.

New kind of brass called "FORMBRITE" cuts finishing costs

The bright, lustrous finish you see on this fireplace equipment — made of FORMBRITE* sheet metal — is the result of a simple color buff that took about half the time previously required. FORMBRITE's appearance after buffing speaks for itself.

FORMBRITE's superfine grain structure provides a surface far superior to ordinary drawing brasses. In every case, it's meant important savings in finishing costs . . . *and* improved product quality.

FORMBRITE is readily formed, drawn or embossed . . . results in products that are harder, stronger, "springier" and more scratch-resistant.

But don't take our word for it. Read what others say about this specially processed drawing brass:

Niagara Searchlight Corp. — "Cuts polishing and buffing time on flashlight end caps 50% . . . plating and general quality are improved, too."

Aeroplane Tackle Mfg. Co. — "We cut polishing costs over 25% . . . on several stamped products we get the required finish by a simple tumbling before lacquering or plating."

Sheaffer Pen Co. — "Savings in polishing costs are as high as 50%. Formbrite gives us a longer-lasting product."

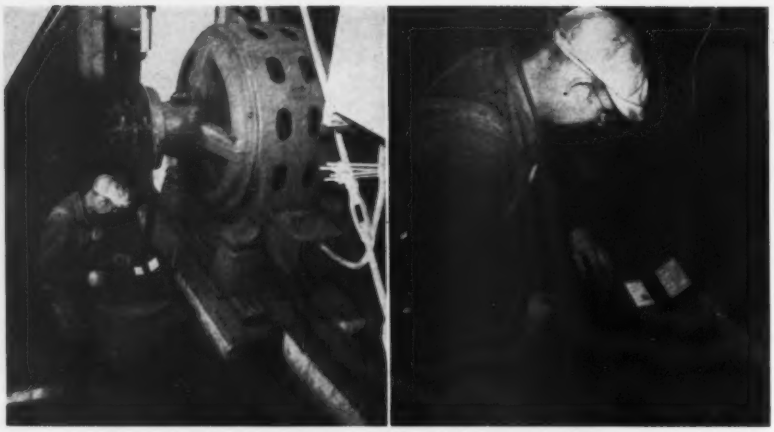
Yet with all the plus values FORMBRITE offers over conventional brasses *it costs no more.* You can do it better, faster and cheaper with FORMBRITE. Want a sample? More information? Write: *The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.* *Reg. U. S. Pat. Off. 5483

Formbrite

an ANACONDA® product

made by The American Brass Company

DISTRICT SALES OFFICES: *Los Angeles 17, Calif. at 816 West 5th St. — San Fran-*



INSULATION RESISTANCE is checked with a Megger by cranking the instrument up to 1,000 volts and applying this voltage to the slip rings of a large motor. The Megger can record hundreds of millions of ohms of electrical leakage.

TROUBLE-FREE OPERATION

through carefully scheduled electrical maintenance

WITH EMPHASIS on the preventive side of electrical maintenance and through yearly scheduled attention to each piece of equipment, Pacific Lumber Co., Scotia, Calif., has achieved practically trouble-free operation of all the sawmill's electrical equipment.

Fuel from waste

Pacific, one of the redwood region's largest mills, generates all its own electricity for mill and town, using sawmill waste as fuel.

Considerable electrical equipment is involved in the transporting and milling of redwood logs, whose diameters frequently exceed 6 ft. Peeled logs are drawn by electrical machinery into two sawmills, each equipped with three head rigs, a gang saw, edgers, trimmers, slashers, hogs, sorting and grading tables, remilling equipment and a battery of dry kilns. After preliminary sawing, remilling, sorting, grading, trimming, drying, resorting and grading, the lumber goes into the factory to be machined into usable products. Each of these processes utilizes electricity.

With the exception of a few large wound-rotor motors, which require special cross sections of copper, all of this electrical equipment is maintained by the company's maintenance department.

Mill "B" has enjoyed particularly trouble-free operation of electrical equipment due to the regularly scheduled preventive maintenance practiced by its maintenance electrician, Jack Ballard. His program is as follows:

Very little maintenance is required on small motors that have wick-fed sleeve bearings. A few drops of light oil every three months, plus a thorough blowing out with air when located in dusty locations, is usually adequate. Brushes in motors of the repulsion induction type should be checked for wear and freedom of movement in the brush holders at the same time. Motors of the sleeve bearing type with rotating ring oilers are checked for oil, adding it when necessary, but at least once each month, regardless of size. Brushes of any slipring motors are checked for wear and freedom of movement in their holders at the same time.

No hard and fast rule can be employed with grease lubricated motors. At Pacific some run intermittently; others run eight hours a day and more. Under the company's maintenance

PROPERLY ADJUSTED switching gear needs service only once a year.

LET REPUBLIC SUPPLY YOUR NEEDS!

He said: "That's right, the brain's got pains. Sounds to me like growls from the valves, and maybe a gear loose in the rear. Can you fellows help me?"

We said: "What model and IQ number—brilliant, genius or mental giant? We've got just what you need in stock!"

Moral: Even a mechanical brain knows that Republic Supply has most types of industrial products, standard and special, in their huge warehouse stocks. Whether it's an everyday abrasive you need, or a once-in-a-year splicing needle, you'll get it faster from Republic!

* * * *

THE REPUBLIC SUPPLY COMPANY OF CALIFORNIA

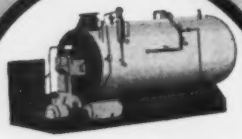
REPUBLIC RS SUPPLY CO

Main offices in Los Angeles & San Leandro. Phones—Los Angeles: RAymond 3-2511, PArkview 8-7151; San Leandro: LOckhaven 2-0414, Enterprise 1-1060
Pipe, valves and fittings • abrasives • shop supplies and tools • rigging materials • mechanical rubber goods • machinery • oil field supplies

An independently owned and operated company serving Western industry

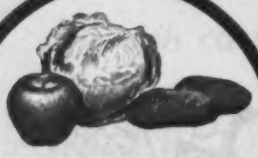
Maas SODIUM SULFITE

Serves many industries BETTER



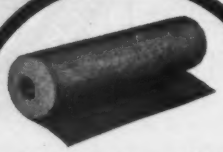
Maas Sodium Sulfite is widely used in boiler water treatment.

Maas Sodium Sulfite is an excellent selective depressant in ore flotation.



Maas Sodium Sulfite helps food processors with quality control.

Maas Sodium Sulfite helps natural and synthetic rubber reclaimers.



Maas Sodium Sulfite helps make better paper.

Maas

A. R. MAAS CHEMICAL CO.
Division Victor Chemical Works
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A R M M

VICTOR CHEMICAL

OTHER MAAS AND VICTOR CHEMICALS FOR INDUSTRY

Sodium phosphates—Ammonium phosphates—Calcium phosphates (Food grade and stock feed grades)—Potassium phosphates—Phosphoric acid—Surface active agents—Oxalic acid—Oxalates—Formic acid—Formates—Acetic acid—Sodium hyposulfite—Sodium sulfite—Sodium carbonate—Triethanolamine phosphate—a full range of photo pure chemicals—and many more.

schedule, motors that run intermittently are greased once a year while others are greased every six months. Small gear motors, i.e., less than 3 hp., have their gear cases checked for oil every two or three months, whereas every six months appears to be sufficient for the larger sizes.

Motors are air cleaned once a year, generally at the same time that they are checked for oil or grease. An exception to this rule are motors around the edgers, which are cleaned with air weekly when their oil level is checked.

Switching

Under the operating conditions at Pacific, magnetic, air-brake, across the line starters, such as those used on motors of 10 hp. and under, and on electric type carriages of head rigs and feed chains of the trimmers and lumber stacking hoists, need servicing every three months.

Drum switches are cleaned by wiping off segments and fingers with a rag; then they are readjusted and segments lubricated with a light coating of vaseline. This is done weekly on log haul controllers, monthly on band mill controllers and every three months on all others.

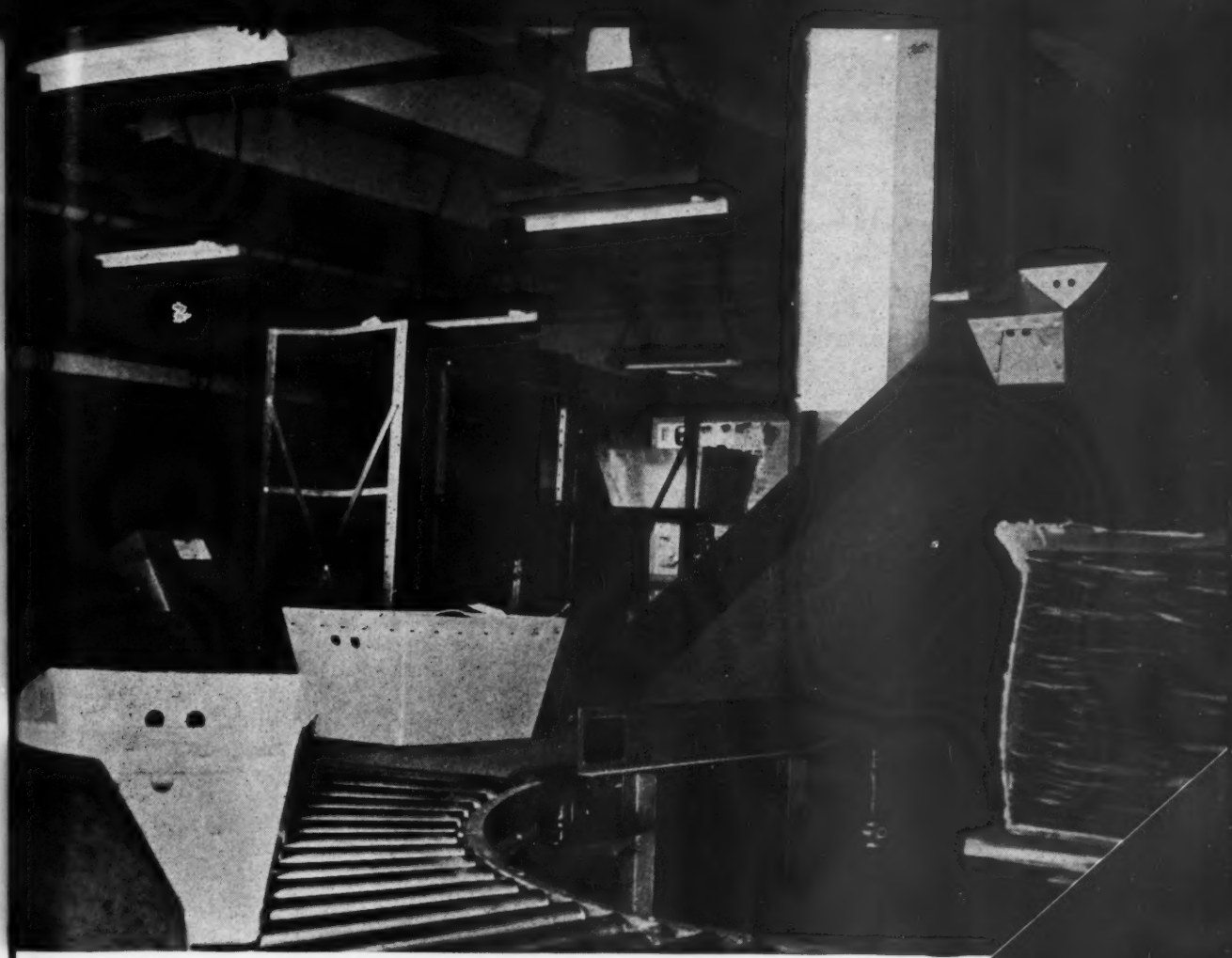
Oil immersed switching gear and reduced voltage starters, if properly adjusted, need servicing only once a year. "Proper adjustment" means that all contacts that make and break simultaneously should be carefully adjusted to do just that. If one or two pairs of contacts carry all the make-and-break current, heavy arcing and consequent burning of these contacts will result.

Log carriages are subjected to abnormally high shock forces which tend to derange and throw the equipment out of alignment. Therefore, to keep lost time at a minimum, all electrically operated equipment on the carriages is inspected weekly.

In order to insure regular attention to all electrical equipment, maintenance records of each inspection are kept. This is done in any manner best suited to the particular job and ranges all the way from a Kardex system on some units to a mere posting of the date in chalk on other units. This system depends entirely on the type of unit and the frequency of inspection.

Another important maintenance consideration is testing of the insulation resistance on various electrical units. A 1,000-v. Megger, which is inconvenient for smaller pieces of equipment, is used to a considerable extent on large key equipment.

Closely allied to the maintenance program and probably just as important from a lost-time angle is keeping a proper supply of parts.



Thermoid Conveyor Belting cuts your handling costs

There's a Thermoid Conveyor Belt designed to lower your costs on every type of materials handling job. Each is best suited for the particular type of service recommended. Here are 3 selected from the complete Thermoid line: NEOPRENE—built especially for conditions where heat and oil are encountered; THERMOGLAS—designed for use where belt is exposed to temperatures of 275° to 350° F.; RUFFTOP—Thousands of irregular gripper points guide smooth surfaced articles up inclines to 35°.

Thermoid's exclusive impregnation process welds carcass and cover into an exceptionally strong, durable belt. Finest quality reinforcement and specially compounded rubber stocks assure long life, less down time, lower handling costs. Your Thermoid Distributor can help you select the Conveyor Belt best suited to your requirements. If you prefer, write direct for Catalog 3679.

Thermoid
Weston, N.J.

Conveyor & Elevator Belting • Transmission Belting • F.H.P. & Multiple V-Belts
Wrapped & Molded Hose • Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Offices and Factories: Trenton, N.J. Nephi, Utah

Your Western DELTA Dealer carries a complete stock of Delta Toolmaker Surface Grinders and Attachments, plus all other Delta Metalworking and Woodworking Power Tools

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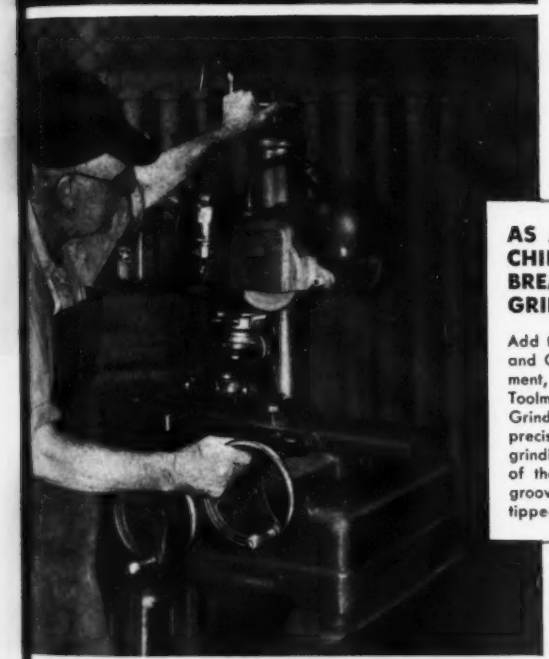
DELTA MILWAUKEE

DELTA QUALITY MAKES THE DIFFERENCE

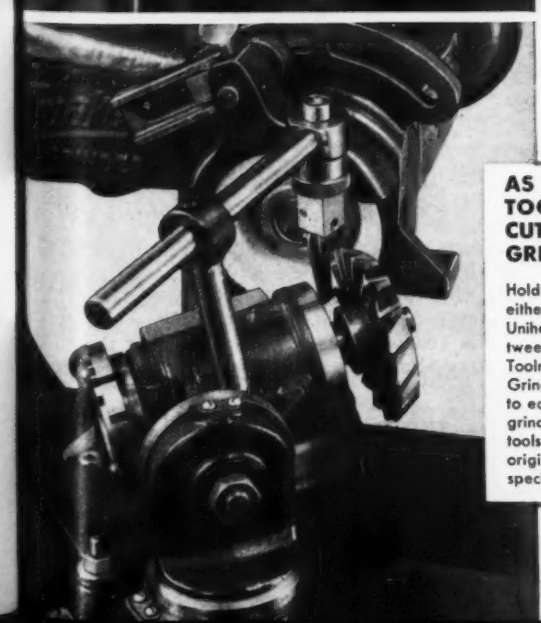
AS A STANDARD SURFACE GRINDER

The basic DELTA Toolmaker Surface Grinder is a big, rugged machine with the massiveness and solidity required for surface finishing in tool room or production line.



AS A CHIP-BREAKER GRINDER

Add the Univise and Coolant attachment, and your Toolmaker Surface Grinder is a precision machine for grinding all angles of the chip-breaker groove in carbide tipped tools.



AS A TOOL AND CUTTER GRINDER

Holding your work either in the Unihead or between centers, your Toolmaker Surface Grinder is equipped to economically grind and sharpen tools and cutters to original specifications.

3 PRECISION GRINDING OPERATIONS

ON 1 RUGGED, ROCKWELL-built DELTA Toolmaker® GRINDER

In your plant, 90% of the precision grinding operations can be economically handled by DELTA Toolmaker Surface Grinders equipped with three inexpensive attachments. With these accessories: a coolant attachment, a Univise®, and a Unihead®, you can maintain consistently high grinding and sharpening output of milling cutters, reamers, taps, saw blades, etc. — both high speed steel and carbide-tipped cutters. All this is in addition to the extremely accurate surface finishing obtainable with the DELTA Surface Grinder itself.

Placed in appropriate positions throughout your plant, DELTA Toolmaker Grinders effectively eliminate the "Toolroom Bottleneck." Their low initial cost, dependable accuracy, and rugged construction make them ideal where the demands of fast production and absolute accuracy are inseparable.

Learn how these and other Rockwell-built DELTA tools can save money in your plant. Get in touch with your DELTA Dealer; he's listed on the opposite page.

Delta Power Tool Division, Rockwell Manufacturing Company, 686E North Lexington Avenue, Pittsburgh 8, Pa.

DELTA QUALITY POWER TOOLS

Another Product by **Rockwell**

EFFICIENCY KINKS

Contributions wanted

For each contribution to Efficiency Kinks which the editors feel merits publication, *Western Industry* will be happy to award $5.00. Please send in any details of how your plant solved some problem of design, production, maintenance, or process.

If an idea or improvisation save you time, money or worry, it may be of interest to others.

We are particularly interested in ideas that contribute to the efficiency of production and the reduction of operating costs, novel or new methods of pollution reduction and waste utilization as well as adaption of old tools and processes to do new jobs.

Send all contributions to Efficiency Kinks Editor, *Western Industry*, 609 Mission Street, San Francisco 5, Calif.

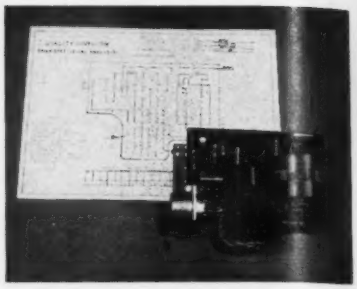
ROOF REPAIR cuts overhead

AN IMPROVED METHOD of repairing furnace roofs at Electric Steel Foundry Co., Portland, Ore., suggested by employee Sam Armenta, is saving the cost of at least 75% overhead. The job is about 85% completed, and the whole operation has gone very smoothly.

Steps taken

Furnace roofs were being repaired by an outside company whose facilities for handling the job are much more elaborate than the new methods being used. Burned out sections of the lower part of the roof channel are now being replaced by a ¾ x 6-in. ring rolled flat in two sections. After burning off the bad sections 6 in. above bottom of the rim, the new sections are welded to the good roof section and the conventional flat ⅝ x 3½ in. ring is attached as before.

Mr. Armenta earned himself $50 by suggesting the improved method.



A TERMINAL BOARD and its analysis sheet show such things as improper soldering, burned wires, wrong component, probable short, etc.

INSPECTION RECORDS spot defect frequency

PICTORIAL inspection records developed by line inspection at LearCal Division of Lear, Inc., Los Angeles, make it possible to identify repetitive defects at a glance. Line inspectors record the defects found in all of the subassemblies of a particular type during the day on a single analysis sheet.

Check marks accumulate in the coded defect blocks at the bottom of the sheet and indicate to production and inspection supervisors what defects occur the most frequently and what corrective action should be taken.

Trying to "smoke out" local dealers?

The answer's in the YELLOW PAGES!

Ever hear of a dealer without a telephone? Of course not. And to increase his telephone orders he advertises in the "Classified" telephone directory. After all, that's where 9 out of 10 people look when they want to find the folks who sell or serve them locally. The Yellow Pages will help you find the product or service you need and the dealer nearest you.

You'll find it fast in the YELLOW PAGES!

Pacific Telephone

NOBLE CRANES

Let Noble give you a lift

WITH YOUR MATERIAL HANDLING PROBLEMS

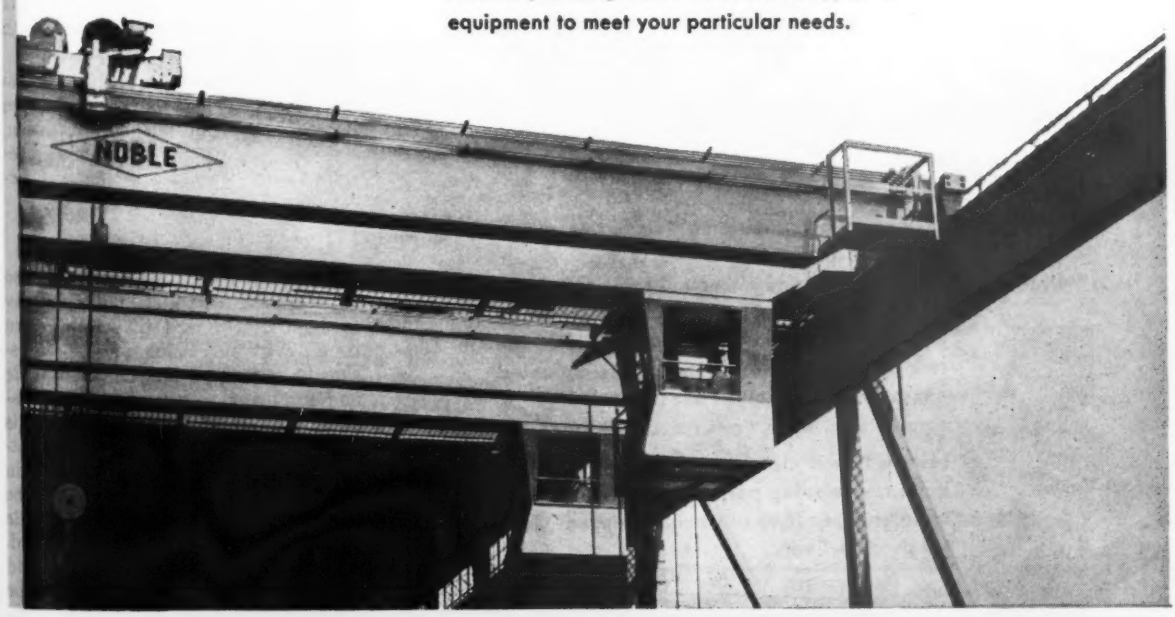
Every day, Noble Company engineers are designing overhead traveling bridge cranes and special type gantry cranes for handling a multiformity of loads, many of which require very precise control of movement. Whether your job is complex or simple, for assembly work or overhead transporting and loading of materials, your crane must be designed for complete dependability and safety and low overall operating cost as well as first cost.

We would like to send you a copy of our new catalog. Make your request in writing please.

Let the men who know how design and build that overhead crane for you. They have the 'know how' that can be attained only through years and years of experience in designing and building cranes of all capacities and types.

C18

Our crane engineering staff is available for consultation and can provide valuable assistance in planning both methods and types of equipment to meet your particular needs.



NOBLE COMPANY

1860 SEVENTH STREET · OAKLAND 20 CALIFORNIA

OVERHEAD MATERIAL HANDLING EQUIPMENT

"FREE TRADE" PROBLEMS AIRED at Pacific NW Trade Assn. meeting

"TRADE PROBLEMS and opportunities of the Pacific Northwest" was the theme of the Pacific Northwest Trade Association's thirty-first general conference at Portland April 12 and 13, dealing with overseas, Canadian-American and purely stateside aspects of trade.

Since the organization is composed of representatives from chambers of commerce of British Columbia as well as of Washington, Oregon, Idaho and Alaska, free trade—or freer trade—got a big boost, although not without some extremely strong opposition.

Leading off was C. S. Thayer, manager of Northwest operations for Alcoa, who pointed out that if a renewable resource, hydroelectric power, had not been used to manufacture an exportable commodity, aluminum, it would not have been used at all. A renewable resource unused is an economic loss, he said.

As the Pacific Northwest area contains a large percentage of the total Canadian-American hydroelectric potential, he felt it was certain that the aluminum smelting industry would continue to expand. A similar view was entertained by P. E. Radley, manager of the British Columbia project (Kittimat) of Aluminum Company of Canada, Ltd., but he proposed that since Canada could produce aluminum pig cheaper than it could be smelted in the States, Canada should perform that operation and let the people in the United States confine themselves to casting, rolling and extruding.

Population prediction

A population increase of 30% in the 1950-1960 decade in Oregon and Washington, and a further gain of 25% in 1975 over 1960 was predicted by Hubert J. Soher of San Francisco, economic consultant. He said it was conceivable that Oregon might double its population in 1975 compared with 1950, and that Washington could report an 80% increase, with other states in the area, British Columbia and Alaska experiencing future growth comparable to the recent past.

Mr. Soher said he had found no evidence that local industry had been denied power for normal expansion, nor that any Eastern concern had refrained from locating in the area because of lack of power supply.

Declaration desired

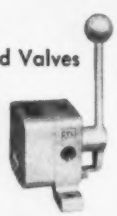
Ralph D. Baker, an American who is president of Standard Oil Company of B. C., criticized his countrymen roundly for not being more progressive in regard to international trade and for being so stupid in their customs management. "If free trade is good between two individuals in Seattle, and between two individuals in Vancouver, why should not the same be true between one person in Seattle and another in Vancouver?" he asked. Canada and the United States should declare free trade between them to be a goal and make a declaration of intent on the subject.

Clarence Hulford, vice president of the National Bank of Commerce, Seattle, offered an apparently new explanation for German price-cutting tactics in export business, namely, that they realized the real profit lay in re-

REMOTE Cylinder CONTROL

with Ledeen POWER operated VALVES

Hand Valves



Instant action of remotely located or automatically operated cylinders is made possible with the new and improved Ledeen Power Operated Valves. These disc-type valves are positive in operation, and are readily adaptable to a wide variety of pilot controls. Solenoid operated power valves are available as complete package units.

Foot Valves

Ledeen Power Operated Valves are fast cycling, have few moving parts, and require very little maintenance. They are available from stock for quick delivery.

Write for Bulletin 1010.

VALVES • CYLINDERS
VALVE ACTUATORS
AIR HYDRAULIC
PUMPS & BOOSTERS

Ledeen Mfg. Co.
1606 So. San Pedro St.
Los Angeles 15, Cal.

CUT HAND-FILING TIME UP TO 90%

ARYING BEVEL GRINDING IS NOW POSSIBLE!

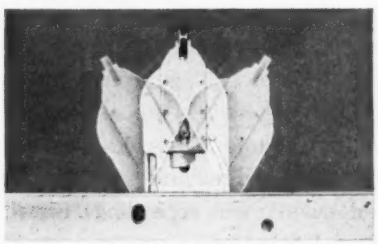
NEW TILT BELT GRINDER INCREASES PRODUCTION UP TO 65%

Slow expensive filing time cut up to 90%. Sierra Tilt Belt Grinder controls permit operator to vary angle during operation and maintain a firm hold on work material at all times.

Engineered for rugged roughing and accurate finishing on varying bevel parts, such as stretch form blocks, hydro form blocks, jig parts, tooling bevels and production parts. Finishes parts with angles up to and including 30° open or closed (120° included angle).

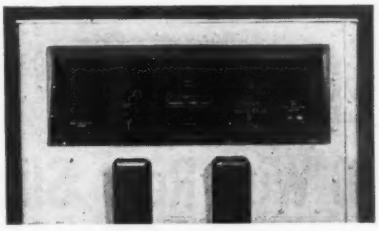
Exclusive grinding belt carrier assembly tilts about an axis that never varies from the work table plane. Directional knee pad controls accurately and instantaneously set angle variations and operator can visually ascertain angle on quadrant at all times. "Autostop" switch allows changing of angles in exact ½° increments.

Refrigerated surface plate keeps material cool for easier, more efficient handling... and Dust-Kop removes waste particles.



Tilted Belt showing 120° included angle

Stretch Form Block *Hydro Form Block* *Jig Part* *Production Part* *Special Form Block* *Die Part*



Control Panel

For complete descriptive literature, write to...

SIERRA MACHINERY CO., INC.

ORegon 8-4471
ORegon 8-6447
141 W. Hazel Street
Inglewood, California

SIERRA

placement parts, therefore they could afford to give the original product away, if necessary. Mr. Hulford's advice was that exporters must get out into the countryside in foreign countries to learn how products are used, and not merely stick to the cities. Brand names are far more important in foreign countries than here, he said. Products of handicraft and cottage industries such as toys and dolls should be encouraged, in his opinion, to balance up exports; so should off-season fruit and vegetable products.

Tariff discussion

An American tariff on lumber made things difficult for Canadian lumbermen, according to H. T. Mitchell, publisher of *The B. C. Lumberman*, but H. V. Simpson, managing director of the West Coast Lumbermen's Association, thought the tariff did not particularly hurt Canadians or help Americans. "The tariff shut the Canadians out of our market, and us out of theirs, but the tariff didn't shut down a single British Columbia mill," he said.

The domestic lead and zinc producers have been badly injured by heavy importations of foreign metal, according to Charles E. Schwab, director of industrial relations, Bunker Hill & Sullivan Mining Co. of Kellogg, Idaho, who cited many statistics to support his case , and reported that prices had dropped so low that many mines had been forced to close down. Domestic zinc production had reached the lowest point since 1938, and lead the lowest since 1935. An import quota for the United States and Canada might be one solution of the problem, he thought.

"But where does all this tariff business end?" came a query from the floor, from a man who said he had been a state mine inspector at the Broken Hill mine in Australia. Oregon softwood had proved ideal for mine timbering, he asserted, but when Australia slapped a tariff on it the miners had to fall back on Australian hardwood, which was nowhere near as good.

Future markets

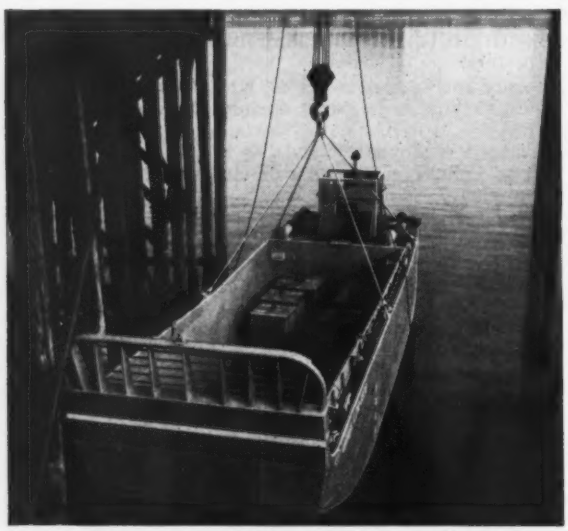
Paper and pulp are Pacific Northwest products for which future markets are big, according to Paul C. Baldwin, vice president of the Scott Paper Company in charge of the operations at Everett, Wash. Canadian pulp output, for example, is 60% greater than in 1945. As for an undeveloped world market, he cited the following figures of annual consumption in pounds per capita:

United States	400
Hawaii	50
Japan	34.4
Mexico	16
China	2.0
India	1.25

"More dams are needed than there are builders to build them," asserted Gov. Len Jordan of Idaho, reporting that by 1964 with a load requirement of 13,500,000 kw. we may expect a deficiency of 2,000,000 kw., which must be provided by new projects not now in building.

MOBILE CAFETERIA wins service award

A NATIONAL FOOD SERVICE Award is being given to Douglas Aircraft Co., Inc., for its mobile feeding system which feeds more than 4,000 employees during a single 30-minute lunch period on each of two work shifts at the Torrance, Calif., plant. Twelve trains, each with three carts carrying identical menus of hot and cold food from a single commissary-kitchen, convey food to appointed areas near ten modern dining rooms scattered throughout the factory.



Proof testing sling on a U.S. Army LCM-6 at Gunderson Bros. Engineering Corp., Portland, Oregon. (Note concrete weights).

These Army LCM's use special Tiger Brand Wire Rope slings!

The special Tiger Brand Sling used for launching and retrieving this versatile new Army LCM-6 landing craft is fabricated of 1⅜" galvanized wire rope. In the proof lift (left) these slings are subjected to a total load of more than 43 tons. Tests like these clearly demonstrate the strength and reliability of Tiger Brand factory-produced, custom wire rope slings. So when you need fitted wire rope assemblies to lift, lower, or carry...rely on Tiger Brand slings. Contact your local Tiger Brand distributor.

Sling Data Booklet! A free informative 102-page booklet that gives complete details on Tiger Brand slings, fittings, etc. For your copy, write Columbia-Geneva Steel Division, 1403 Russ Bldg., San Francisco 6.

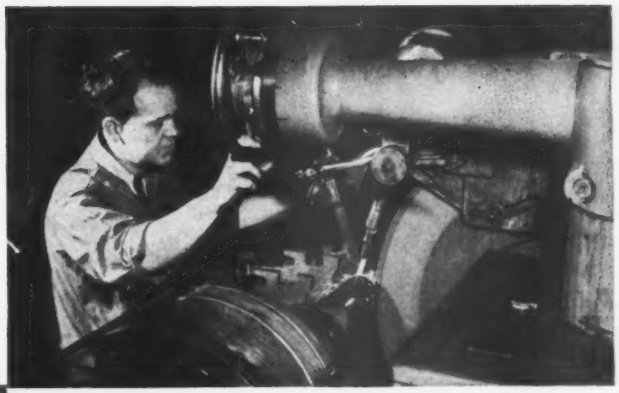
USS

U·S·S TIGER BRAND Wire Rope Slings

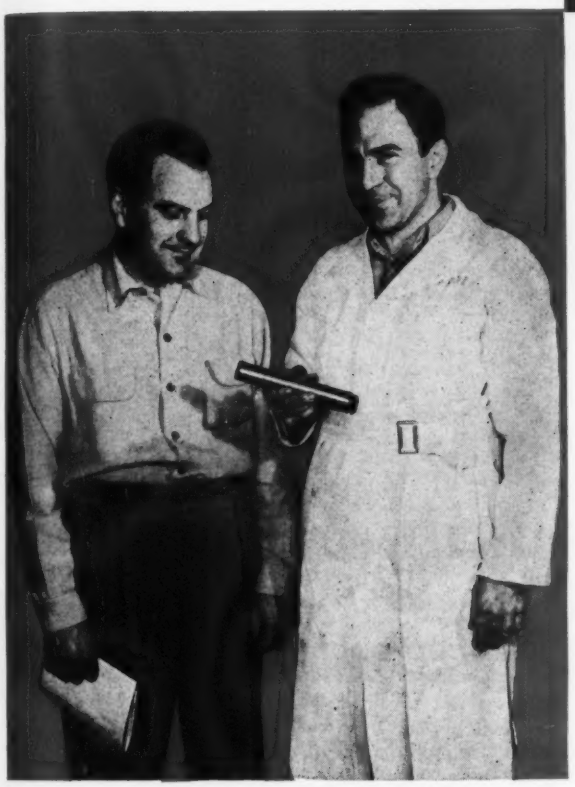
United States Steel Corporation · Columbia-Geneva Steel Division

UNITED STATES STEEL

Only Top Lubricants Can Handle A Precision Job



"Microsphere" spindle bearings on Landis crankshaft grinder are lubricated with Vacuoline Oil E.



Precision Engineering general manager John Vrilakas, left, inspects diesel part with production manager Mark Vrilakas before reconditioning process begins.

There's no margin for error in the business of reconditioning heavy diesel engine parts to minute tolerances—every job has to be right.

John Vrilakas, general manager of Precision Engineering Co. of Sacramento, says, "We depend on our lubricants as much as on our men and machinery—if a lubricant fails, we all fail. That's why we deal with General Petroleum . . . we know we're getting the best in lubricants *and* lube engineering."

In the ten years that G. P. lubricants have been used in Precision Engineering's hydraulically actuated grinders, boring machines, engine lathes and generator units, the firm has developed an enviable name in the trade. Today Precision's customers include contractors, loggers, mining companies and governmental agencies from every state in the West, as well as Hawaiian pineapple and sugar plantations.

Vrilakas attributes his expanding customer list to "Precision's minute attention to detail—and to the G. P. lubricants which help us to achieve it."

Line boring is a precision job calling for top grade lubricants.

Large or small, you'll find your plant will receive better all-around service from the G. P. lube engineer whose job is to keep your machinery running longer for less. Call your nearest General Petroleum office today for the tops in products and service.

SOCONY-VACUUM

GENERAL PETROLEUM CORPORATION

—converting nature's gift to better living

FABRICATED PARTS are checked and hand finished in Dalmo Victor's profiling section.

QUALITY CONTROL— A tool for the small shop too

Here's how it works on job shop operations

By ALAN EAGLE, Superintendent of Quality Control, Dalmo Victor Co., San Carlos, Calif.

MANUFACTURE of the hundreds of delicate parts that go into a series of complex radar antennae brings with it an urgent need for effective quality control. Components of this highly engineered product must meet the ordinary military requirements on interchangeability, while the finished assembly conforms to tight engineering specifications and functional requirements.

Production of such a line of equipment on a semi-job-shop basis, at an annual volume of $24,000,000, with 1,400 employees, is the job presently being undertaken by Dalmo Victor Co., San Carlos, Calif., one of the nation's leading manufacturers of naval airborne radar antenna systems.

Operations include job shop work

Although the company cannot really be classified as small, by either dollar volume or number of employees, the fact that the manufacturing operation includes job shop work in machining, plating, finishing and assembly has necessitated setting up a quality control program essentially designed for the small plant. And the Quality Control de-

VARIOUS production antenna reflector assemblies designed to reflect radio frequency energy into space according to a predetermined radiation pattern.

Why Velvetone's doubt about *Planned Lighting* turned to praise—

Odds are it'll help your people do better work, too

The work of silk-screen artists for the Velvetone Company, San Francisco, takes a fine sense of color and a sure touch. But with the lighting the company used to have, shadows and glare often made it hard to do careful work, and caused lots of eyestrain. That's why Velvetone—though doubtful that its lighting could be improved—called in P. G. and E.'s lighting engineers.

Following a free survey, our engineers suggested a luminous ceiling for shadowless, glare-free light . . . cool-white lamps for accurate color work.

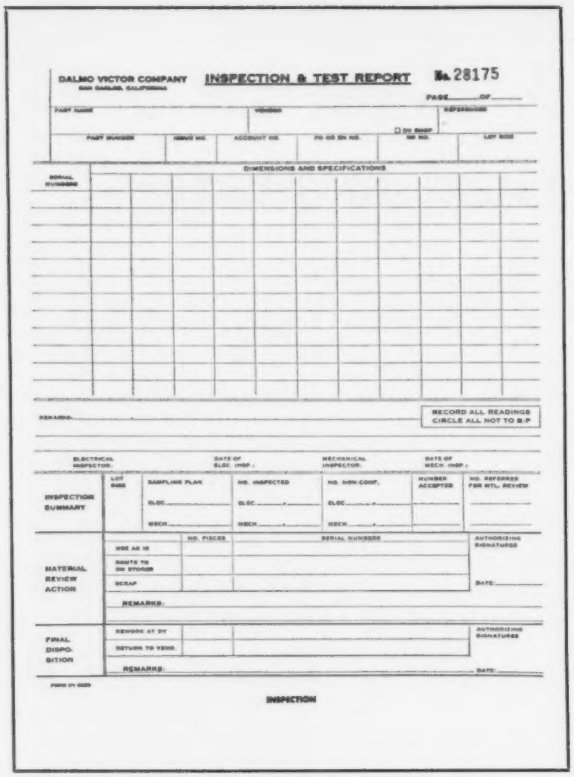
Result: "Our artists do a better job, make fewer mistakes, turn out more work," reports Velvetone. "And eyestrain no longer keeps them from enjoying the evening paper at the end of a day." Cost: $600 . . . "mighty little to pay when you figure all the ways planned lighting helps us."

Your business is probably different from Velvetone's. But it's a good bet planned lighting will benefit your employees in the same ways. And you pay nothing to find out. So let our lighting engineers make a survey for you soon.

For free planned-lighting advice, call your nearest P. G. and E. office today

P·G·and E·
PACIFIC GAS AND ELECTRIC COMPANY

407-X-554



DALMO VICTOR COMPANY — INSPECTION & TEST REPORT — No. 28175

PAGE ____ OF ____

PART NAME | VENDOR | REFERENCE

PART NUMBER | ISSUE NO. | ACCOUNT NO. | PO OR SH NO. | REC NO. | LOT SIZE

DIMENSIONS AND SPECIFICATIONS

SERIAL NUMBERS

REMARKS

RECORD ALL READINGS
CIRCLE ALL NOT TO B-P

ELECTRICAL INSPECTOR | DATE OF ELEC. INSP. | MECHANICAL INSPECTOR | DATE OF MECH. INSP.

INSPECTION SUMMARY

LOT SIZE	SAMPLING PLAN	NO. INSPECTED	NO. NON-CONF.	NUMBER ACCEPTED	NO. REFERRED FOR MTL. REVIEW
	ELEC.	ELEC.	ELEC.		
	MECH.	MECH.	MECH.		

MATERIAL REVIEW ACTION

	NO. PIECES	SERIAL NUMBERS	AUTHORIZING SIGNATURES
USE AS IS			
ROUTE TO RM STORES			
SCRAP			DATE:

REMARKS:

FINAL DISPOSITION

		AUTHORIZING SIGNATURES
REWORK AT DV		
RETURN TO VEND.		

REMARKS: DATE:

INSPECTION

RECEIVING inspectors use this form to record inspection data and results, an important link in the quality control program.

partment at Dalmo Victor takes on a wide responsibility: customer satisfaction on all antenna units.

Chain of command

The superintendent of Quality Control reports to the vice president and general manager, while reporting to him are heads of the Inspection department, RF (radio frequency) Test department and the Final Test department.

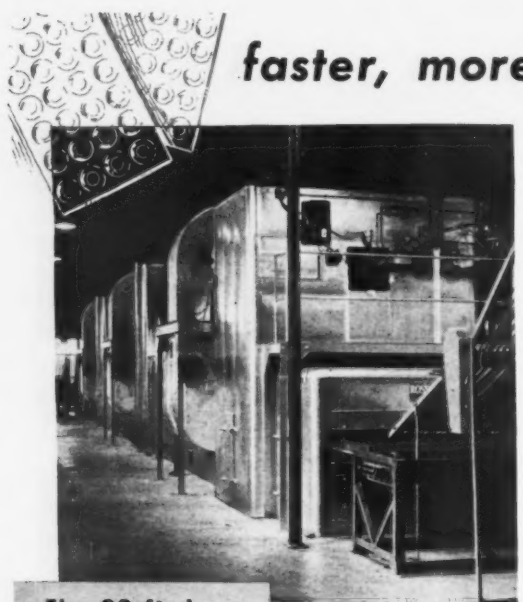
Inspection is responsible for receiving and in-process inspection, RF Test for testing all wave guide components and all radiation checks on each antenna reflector, and Final Test for functional tests on the complete assembly.

All customer complaints are referred back to the Quality Control department, which has the authority to refuse to ship any equipment of questionable ability. Tact and diplomacy are as important as technical competence in exercising this authority, for a great deal of interdependence exists between Quality Control and other operating departments, as will be found in many small plants.

Although statistical applications of quality control are always important, it is my impression that the small plant quality control man will devote the majority of his time to problems of a non-statistical nature. Operational control problems requiring the most attention at Dalmo Victor were managerial or procedural problems rather than technical or semi-engineering problems.

Perhaps the greatest contribution to the effectiveness of the system will come from setting up and maintaining a workable and comprehensive control system. The first job is to define operating practices whose specific objective is to insure that the finished product satisfies the needs for which it is designed. These operating practices must be improved and reduced to a set of written procedures.

This set of procedures must provide for maintenance of



faster, more uniform drying of molded pulp products

WITH THIS MODERN GAS FIRED

ROSS 3 ZONE Dryer

To insure greater capacity at reduced operating cost in making its molded pulp apple trays, the PACIFIC PULP MOLDING CO. of Wenatchee, Wash., now operates this advanced type ROSS Dryer. Like so many other leading manufacurers, they chose to rely upon ROSS' long experience to give the better processing with better-than average equipment.

The 90 ft. long ROSS Dryer is of insulated panel construction. Gas fired air heaters supply each of its 3 drying zones. It operates at 400° F.

See our catalog in Sweet's Plant Engineering File or write us for copy.

ROSS KS SYSTEMS

J. O. ROSS ENGINEERING CORPORATION

MANUFACTURERS OF AIR PROCESSING SYSTEMS

600 ST. PAUL AVE., LOS ANGELES — 823 SKINNER BLDG., SEATTLE

HUSH!
HUSH!
Here at Sacramento, California, Aerojet-General Corporation manufactures highly specialized Rocket Engines for the U. S. Armed Forces.
Every project at this Aerojet Plant has a Secrecy Classification.
But... It's no secret that all production machines in this plant use just one modern multi-purpose grease . . . Shell Alvania

The importance of superior lubrication in such a setup is obvious . . . but that's not all! Aerojet-General Corporation gets many other advantages from using just the one grease:

1. **Shell Alvania pumps *freely* in cold temperatures, yet will not run out of bearings under excessive heat.**
2. **It has extremely high oxidation stability.**
3. **It extends time between greasings . . . a substantial saving in labor and grease.**
4. **Simple inventory . . . just the one grease to stock and apply.**

For further information on Shell Alvania Grease write to Industrial Lubricants, Shell Oil Company, 50 West 50th Street, New York 20, New York—or 100 Bush Street, San Francisco 6, California.

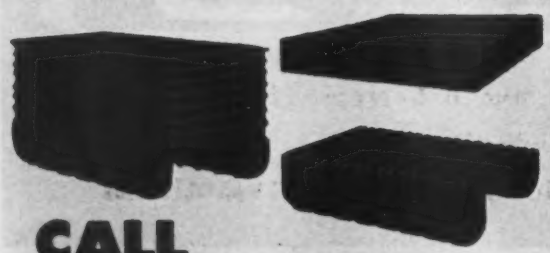
SHELL ALVANIA GREASE

The True Multi-Purpose Industrial Grease

SHELL

IT'S SMART ----

--- TO PLAY SAFE
WITH LONG WEARING
ALL STEEL EQUIPMENT



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NOW

Be smart! Why take chances when it costs so little to play safe with rugged, maintenance-free all-steel equipment that can be used over and over and over again. Compare all costs and you'll specify all-steel by Powell.

* Originators and leading producers of cold-formed all-steel materials handling equipment. Powell—Since 1920.

WEST COAST REPRESENTATIVES

IRA G. PERIN CO. SAN FRANCISCO LOS ANGELES
AIR MACK, INC. of WASHINGTON — SEATTLE
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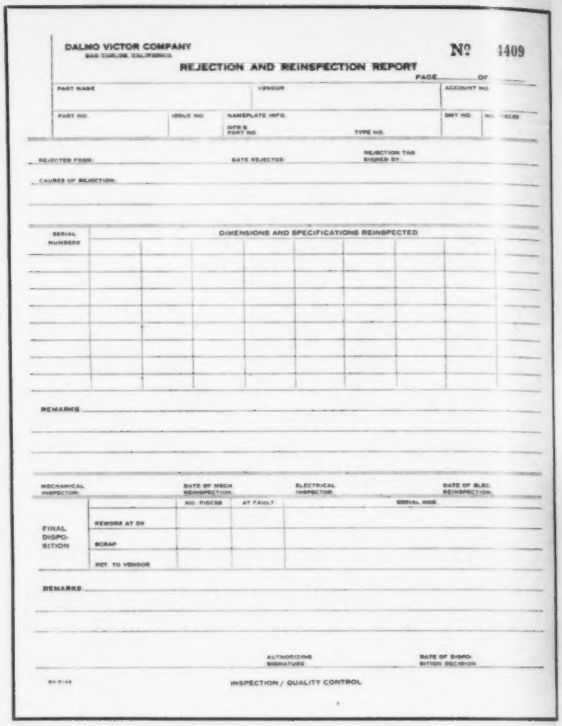


DALMO VICTOR COMPANY

REJECTION AND REINSPECTION REPORT

No 1409

PAGE ____ OF

PART NAME | VENDOR | ACCOUNT NO.

PART NO. | ISSUE NO. | NAMEPLATE INFO. | DPS'S PART NO. | TYPE NO. | DWT NO. | NO. RECD

REJECTED FROM: | DATE REJECTED | REJECTION TAG SIGNED BY:

CAUSES OF REJECTION:

SERIAL NUMBERS | DIMENSIONS AND SPECIFICATIONS REINSPECTED

REMARKS

MECHANICAL INSPECTION | DATE OF MECH REINSPECTION | ELECTRICAL INSPECTION | DATE OF ELEC REINSPECTION

NO. PIECES | AT FAULT | SERIAL NOS.

FINAL DISPOSITION: REWORK AT DV | SCRAP | RET. TO VENDOR

REMARKS

AUTHORIZING SIGNATURE | DATE OF DISPOSITION RECEIPT

INSPECTION / QUALITY CONTROL

REJECTION RESPONSIBILITY is established by this form.

adequate inspection records, notification of vendors of quality results, a responsible review of non-conforming material, provision for raw material certification, protection against rejected parts being returned to the line, and others.

All departments must conduct their operations in accordance with these accepted quality control procedures in order to assure proper functioning of the system.

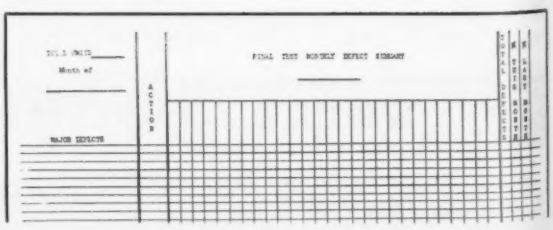
Forms for quality control

The best place to start in preparing quality control procedure is with forms to be used. Two forms, especially designed to satisfy specific quality control needs, have been particularly useful. The first of these is the Inspection and Test Report used by receiving inspectors to record inspection data and results.

Early in the quality control program, receiving inspectors used a form that is really a combination receiving and inspection report. A blank section in the middle entitled "Reasons for Rejection" was left for the inspector to record only those dimensions which were outside of the blueprint tolerances. He was performing sampling at his own discretion to satisfy himself as to the lot's conformance or

Continued on page 74

REPETITIVE DEFECTS are recorded and posted in all departments.



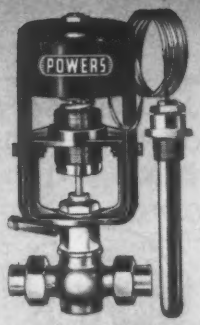
FINAL TEST MONTHLY DEFECT SUMMARY

MAJOR DEFECTS | ACTION | TOTAL DEFECTS | TOTAL UNITS TESTED | % LOT REJECTED

Above: POWERS ACCRITEM Temperature Regulator, is water or compressed air operated. Controls FLOWRITE diaphragm valve (right). Widely used for Water Heaters and Industrial Processes.

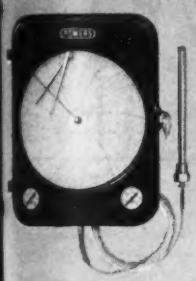
POWERS Type H Thermostatic Water Mixers Insure utmost comfort and safety in showers and other types of baths.

Also used for many processes. Users report ½° F. ± accuracy. Capacities 5 to 10 gpm. @ 45 psi.



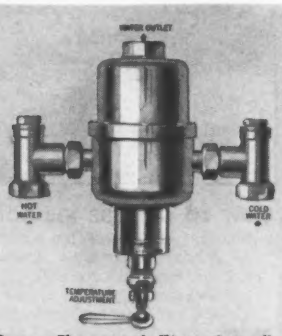
Powers No. 11 Self-Operating Regulator widely used for water storage heaters, heat exchangers, fuel oil preheaters and many industrial processes.

WATER Temperature CONTROL?



Powers Series 100 Recording Controller. Compressed Air Operated.

POWERS FLOWRITE V-Port-Characterized Diaphragm Control Valve.



Powers Thermostatic Water Controller for regulating temperature of mulitple type showers, hydro-therapy and industrial processes. Capacities 22 to 125 gpm. @ 45 psi.

Powers Remote Bulb Type D Thermostat for Unit Air Conditioners.

POWERS PACKLESS VALVES

For controlling chilled, or heated water in unit air conditioners.
No leakage
No packing maintenance

Call POWERS

Most Complete Line of Controls Made Only a few are shown here

for All Types of Baths, Water Heaters and Heat Exchangers

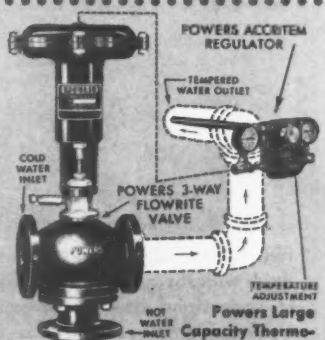
- Forced Hot Water Heating Systems
- Radiant Panel Heating Systems
- Air Conditioning Units using Chilled and Heated Water
- Cooling Water for Air Compressors, Diesel, Gas Engines, and Cyclotrons
- **Many Industrial Processes:** Photo Developing, X-Ray, Color and Ordinary Film, Lens Polishing and Grinding, Chocolate Enrobers, Plastic Molding Presses, etc.

Our More than 60 Years Experience will be valuable in helping you select the right control for your requirements. Contact our nearest office or *Write us direct for Condensed Catalog Rb 24.*

THE POWERS REGULATOR CO.

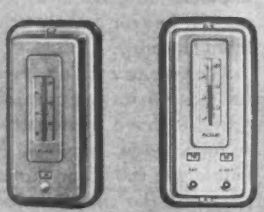
Skokie, Ill. • Offices in Over 50 Cities in the U. S. A., Canada and Mexico

PACIFIC COAST OFFICES:
Los Angeles, Calif., 3200 W. Temple St.; Portland, Ore.; San Francisco, Calif.; Tacoma, Seattle 4, Wash., 2800 - 15th Ave. W.



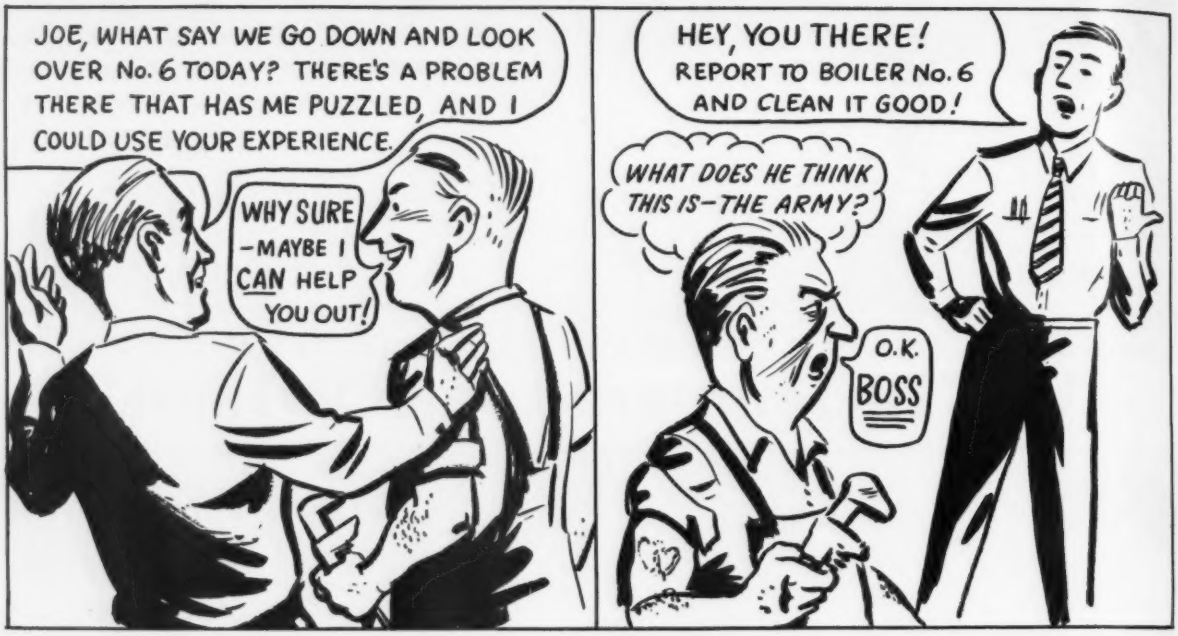
Powers Large Capacity Thermostatic Water Mixing Valve Controlled by an ACCRITEM Temperature Regulator. Capacities 20 to 1200 gpm. @ 45 psi.

Powers MASTROL Control for regulating forced hot water heating systems.



Powers Room Type Pneumatic Controls for Radiant Heating-Cooling Panels, Convectors and Unit Ventilators. Valves are packless. No more packing maintenance. No leakage.

(1d81)


JOE, WHAT SAY WE GO DOWN AND LOOK OVER No. 6 TODAY? THERE'S A PROBLEM THERE THAT HAS ME PUZZLED, AND I COULD USE YOUR EXPERIENCE.
WHY SURE -MAYBE I CAN HELP YOU OUT!
HEY, YOU THERE! REPORT TO BOILER No. 6 AND CLEAN IT GOOD!
WHAT DOES HE THINK THIS IS—THE ARMY?
O.K. BOSS

HOW TO GET THE JOB DONE

HOW NOT TO . . .

Last in a series of four human relations articles

You can drag a man to LABOR but you can't make him WORK

. . . and if you're a supervisor versed in human relation practices you request rather than command, lead instead of drive

By W. DON WEIDNER, Management Services, Colorado Springs, Colo.

FIRST INSTALLMENT of this series dealt with the necessity of being able to understand as well as reprimand wayward employees. It was pointed out that all individuals desire to be like others but at the same time feel the need to act independently. Good human relations practices demand an understanding of these conflicts and must endeavor to help others to meet them squarely.

The second article covered the need for job satisfaction and job security in order to have contented employees. A high wage, alone, is not enough. Employees should be made to feel important. The third installment concerned itself with helping a new man find his niche. First impressions are lasting and good supervisors recognize the importance of making a new employee feel at home.

IT IS VERY important to orient the new employee properly and make him feel secure and respected in his new job. But what about the employee whom we have worked with for several years? An employee old in years of service must also be given careful consideration.

Two kinds of orders

The supervisor can start human relations from the time he issues an order by "requesting" that a job be done, not "commanding." The employee understands the basic function of the supervisor as being the director of his activities. So, a request that a job be done registers in the mind of the employee as an order anyway. Commanding embodies the thought of pushing people around and he resents it.

Leading an employee into a job and not driving him into it gains the cooperation of the employee. "They have a breakdown over on No. 6 this morning, Bill—let's go over and see what we can do to set them straight," is a request that leads Bill into a job. The order "Report to No. 6" is commanding, no "we" or "you" feeling. It tells the employee nothing and he is likely to resent such an order. He will probably say "Yes, Sarge" under his breath.

The most frequent human relations crime committed every day is negative fault-finding on a job badly done. The human-relations-minded supervisor assumes the employee desired to do a good job but that something interfered, and he attempts to find out why. Show how to improve; train; do not find fault. If the employee cannot do the job after you have trained him (not showed or told him how—this is not training) then transfer him or let him go. Finding fault with someone you

are responsible for training who is not mentally and physically equipped to do the job is taking it out on the other fellow. Nothing constructive is accomplished.

Another basic supervisory practice of good human relations is setting a good example that will be followed by your employees. One fundamental matter too frequently overlooked by supervisors is the copy-cat action of their employees. Remember the basic motivation of wanting to be like others —your employees copy you. If you set a good example in your relations to supervisors at your same level or with supervisors above your level, your employees will copy and reflect those actions.

If you run down the supervisors or department next door or the superintendent or top management, your employees will do the same thing. Barriers will become established between your department and the one next door, between your employees and the actions of top management, i.e., rules, regulations, policy, etc.

Remember, you are a leader, and basically employees (people) want to be led. They will follow your example.

The practice of good human relations involves on the part of a supervisor the recognition of an industrial plant or a department of employees as a social system. Employees in a plant are an informal organization with practices, rules, regulations, recognitions, fears, likes, dislikes. There are informal groups who watch and report to their groups on certain matters; they have their recognized group leaders; they bring pressure to bear on certain members who resist their group or even management if their action is detrimental to the group as a whole.

These informal employee organiza-

EMPLOYEES of a large Eastern oil company were moved from a downtown office location to one on the bay near their refineries. Despite the fact that they spent less time going and coming to work, saved $12 per month in parking fees, had their own excellent cafeteria and air-conditioned offices, they deeply resented the move. Production suffered; morale was low.

Probing deeper, the reason was found. Their original status was violated. Instead of working "downtown," they were now working in the "bay area," a personal prestige demotion. Management failed to recognize this apparent human relations matter. It was many years before the employees adjusted to this change of lowered status, before production came back to original levels.

Human relations is understanding the little human things in the life of the normal employee.

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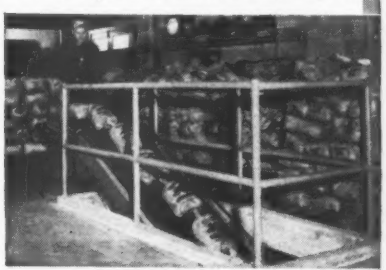

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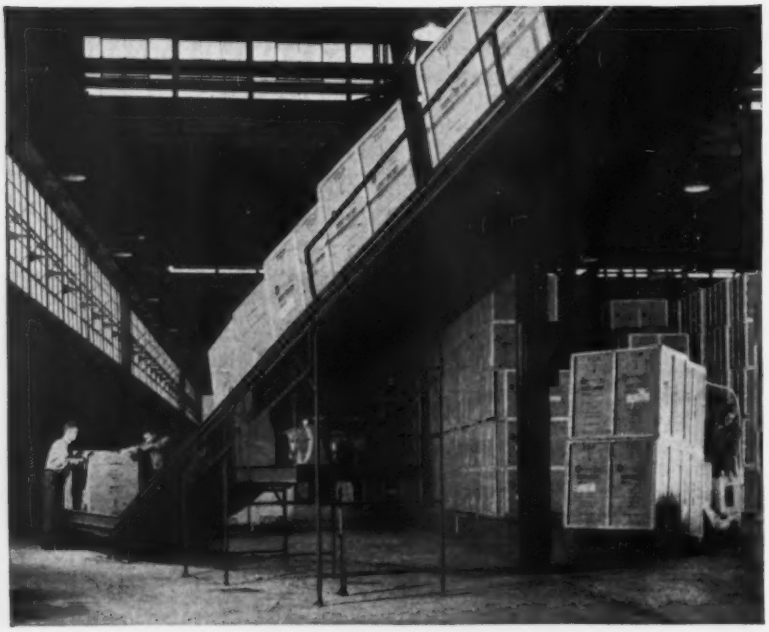

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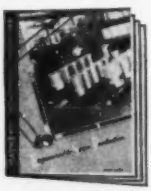

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tions can be used to the advantage of the supervisor if he becomes sensitive to their presence and organization. Many times, dealing with the informally recognized group leader can save much time, effort and money by getting the job done speedily and with employee cooperation.

From a human relations point of view it must be understood that the employee is an important person in his own eyes and he must maintain that importance since he has in reality established a certain status. He will defend that status if it is threatened or violated. His status as a first-class welder, for example. His family, friends, neighbors and fellow workers understand Bill is a first-class welder. Violating the acquired status—based upon education, time, effort—will cause trouble because violation means that Bill will lose face in the eyes of family, friends, and fellow workers.

You have heard an employee say: "If I have to do that, I'll quit!" Momentarily, his loss of face is powerful enough to overrule the desire for the security of his job. He is being very independent. This happens most often in the case of old service employees who have spent a good part of their lifetime in acquiring status in the eyes of the informal organization of their fellow employees.

Appreciation important

Now there are times when this status violation must happen. The human-relations-minded supervisor recognizes that he must protect and maintain the status of the employee chosen to do a sub-level status job. He can do this by giving recognition first to Bill, indicating that he realizes and appreciates Bill's status as a first-class welder, and because of that and the fact of Bill's over-all general knowledge of plant operations, he can do a real service to the company, himself and the operators of No. 6 if he will help them repair and clean out the screens (a dirty, miserable job). Bill can now give a good reason why he is doing this dirty, miserable job, rather than first class welding; he is saving face, and maintaining his status.

Employee status is also maintained by proper communications, keeping the worker informed. This makes him feel important; he has been taken into consideration and told or asked.

Help each employee find a way and adjust to the change and it will have his support. Uproot him from his friends, accustomed practices, job status, and he is bound to resist—the fact that his job may be better, he will make more money, etc., will, in his mind, not offset these influences.

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. . . Begins on page 66

nonconformance to stated tolerances. Under this loose system there was no way of checking responsibility for faulty parts back to the individual inspector.

It became obvious that if control was to be exercised over inspection, if quality data was to be supplied vendors, if sampling techniques were to be utilized, an adequate inspection report form had to be provided.

The new form was devised with those objectives in mind. It provides a space at the top for complete identification of the lot of parts; a space at the bottom for summary of inspection results, material review action and final disposition of nonconforming lots.

The second form is the Rejection and Reinspection Report. It provides a place for recording conditions under which the part was originally rejected from the assembly line, another for recording detailed results of reinspection of the part against purchase specifications after line rejections, and a third for indicating the final disposition of the part, including a statement as to responsibility for the failure (i.e., vendor or Dalmo Victor). One man was given responsibility for preparing these forms on every electrical component rejected. He is also responsible for liaison between Quality Control and Purchasing departments on questionable cases.

Background for this form, as in the case of the Inspection and Test Report, was trial and error. One of the first problems I had to meet at Dalmo Victor was the handling of defective electronic components rejected by the assembly line or test groups and returned to our vendors.

Vendors were receiving rejected components with little information as to cause or condition under which they had been rejected and so were taking issue with our rejecting what appeared to be used parts. In many cases they were refusing to repair or replace these parts except at our expense.

Since the parts were rejected from our assembly line or test stands, they showed evidence of having been assembled onto the equipment. We discovered that parts were being rejected from the assembly line for legitimate failures, many of which could not be caught in the initial receiving inspection of parts. These included such troubles as potentiometer stacks losing adjustment, motors failing during the four-hour run, motors freezing during the cold test, etc.

Most failures were protected by vendor's warranty, which the vendors were willing to honor provided they were given an adequate explanation of the conditions of failure and the reasons for rejection. The problem boiled down to a matter of working up a procedure to secure this information at the time of initial rejection, record it, and forward it back to the vendor with the rejected parts. A new form was adopted and soon cleared up the considerable confusion connected with the rejection of electrical components. It resulted in considerable dollar savings through the establishment of legitimate repair or replacement costs.

Engineering problems

Technical or semi-engineering problems generally show up in the RF and Final Test department. This is the last group to handle completed units before final shipment, and symptoms indicative of later field failures often appear during the four-hour final test run.

Personnel must be trained to recognize signs of impending trouble. They must know which defects indicate minor quality failures (i.e., workmanship, quality, parts, etc.) and which ones represent major design problems requiring engineering atten-

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tion. Where problems of a design nature are suspected, word must be gotten back to the project engineer for immediate action. Quick action is especially important since literally thousands of dollars are spent on disassembly, reassembly, extra test time and other costs associated with production delays.

It is Quality Control's job to catch as many of these problems as possible before they become serious. Other departments must be kept posted, and for this we devised a form called the Final Test Monthly Defect Summary Sheet.

This form provides space for listing repetitive defects, including both quality and design troubles, and for listing antenna serial numbers. As these defects occur, check marks are made by test personnel to indicate which antenna has experienced which defect. Repetitive defects show up immediately. A column is provided to indicate the department responsible for taking corrective action on recurrent defects.

Forms are posted at the assembly line and are reproduced at the end of the month and distributed to all affected departments. This approach has been found far more effective than a chart giving defects per unit, since the new forms break down and enumerate actual defects for all other departments, particularly engineering.

Receiving inspection

The receiving inspection function in the small plant has been treated in a wide variety of sampling plans. In my opinion, however, not enough has been said about how to adapt these plans to specific situations encountered in small plants. At Dalmo Victor the specific conditions encountered are:

1. Small lot sizes. The average lot size varies from around 40 to 100 pieces.

2. Inspection on a job-lot basis. A lot of parts of a particular type will be inspected one day and the same type not be seen again for possibly two months.

3. Many dimensions to be inspected on many different types of parts. This includes inspection on such diverse parts as gears, bearings, wave guide components and electrical components, hydraulic components, and hundreds of mechanical parts of all sizes and shapes.

4. Many tolerances not entirely accurate. Recognition should be made of the "twilight zone" around established tolerances. A large percentage of parts outside specified tolerances will still function quite well in the equipment and still meet interchangeability requirements. This fact is important since it necessitates the establishment of a material review function.

What system then can be established to make receiving inspection as effective as possible? After the inspection force had grown used to the new Inspection and Test Form, the next step was the introduction of a statistical sampling program. Two sampling programs were selected with AQL's (acceptable quantity levels) of 1% and 4%. These levels were shown arbitrarily to satisfy our requirements and the two plans were labeled tight sampling and normal sampling.

Next engineering assistance for the determination of which dimensions to inspect under the sampling plan was handled through a form called "a marked print" program. Each project engineer reviewed prints of his project and circled all dimensions which he deemed truly critical. Quality control inspection personnel then reviewed the marked prints, decided which circled dimensions would get 100% inspection and which would be inspected under the type sampling plan. Remaining dimensions were given normal sampling inspection.

Continued on page 85

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How to CHOOSE YOUR NEXT EXECUTIVE and get the MAN YOU WANT

A thorough, well planned approach instead of a hit or miss process can make all the difference

By

JAMES T. LANG

Associate
McKinsey & Company
Management
Consultants
San Francisco

A WELL-PLANNED, thorough and effective executive recruiting program should begin with a review of the company's long- and short-term objectives and the resultant policies. It should also consider the over-all organizational plan for the proper coordination of areas of executive authority and responsibility.

The position description for the job in question should then fit these requirements and it should be put in writing. Only then can you know the caliber of man you are looking for and plan a program for searching, screening, selecting and orienting this man to your organization. Only then can you be reasonably sure that the man you choose is the best for the true needs of your company.

A prominent company in the Bay Area of California recently followed these exact procedures in obtaining a director of engineering. Their planning and search took less time, cost less money and resulted in a better executive than have many less formal recruiting adventures.

Here is the eight-step approach which they followed:

1. They defined the job and the job relationship within their company. Their written position specification included:

(a) The position title. The precise title is of real importance to many people—for their employment record and for their relationships within the company.

(b) The geographical location of the job.

(c) The basic functions of the job. What the holder of the job is expected to accomplish and how.

(d) Organizational relationships. To whom he reports, who reports to him, and his relationship to other company executives.

(e) Personal requirements for the job. The age range, health, appearance, and other personality-temperament traits best suited to the job; also the necessary academic and practical experience.

(f) Special industry experience requirements, such as, in this case, broad knowledge of several types of chemical process industries to enable him to

---

WHILE IT IS often in the best interests of all concerned to hire a new executive from outside, many firms hunting for men to fill key positions could profit from scrutinizing their own rosters a little more closely. If there aren't any men even remotely qualified for the jobs in question, it might well be time to sit back and examine the company's policies for training and advancing men to see if some of the presently employed talent isn't being wasted.

• ● •

Administrators responsible for choosing a new executive may often be heard to groan at the cost of doing a thorough job of selection. Finding the right man may cost $500, $1,000 or even $5,000, but if he is really "the right man," chances are he's worth it. More often than not, the wrong man in that position could cost you five times the price you paid for him in just one year.

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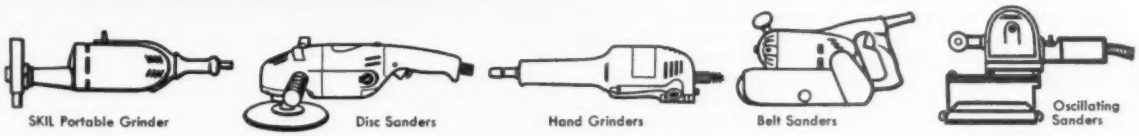
FOR EXAMPLE: How many steps per day do your men waste carrying tools or work to a distant bench grinder? Steps that mean lost time, lost production dollars? Break *this* "bottleneck" with the *new* SKIL 6" Bench Grinders by spotting several of them around your shop in strategic locations where your men can get to them in the fewest minutes possible.



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design and develop special situation machinery.

(g) Duties and responsibilities of the job. The position's assigned duties and areas of responsibilities in relation to other executive positions.

(h) Proposed compensation. Total means of compensation including base rate range, bonus arrangements, and such "fringe benefits" as stock purchase plans and insurance programs.

The position description should be so clear and specific that no one would need question the individual's duties, responsibilities and authority. Also, these requirements should serve to circumscribe the qualities in the man needed to do this job.

Written request

2. They requested assistance from other companies by letter. The letter explained why the job was unsuited to any of the company's present personnel and that these individuals knew of the present action. Each company was told the names of the other companies and agencies which had also been asked to help. In addition, the letter contained a timetable on how the company hoped to proceed. Each company was asked to review the position specification and to obtain resumés on individuals known to be available who would generally fit these qualifications. The company did not

X-Y-Z Corporation

SAN FRANCISCO, CALIFORNIA

Position Description—Interview Appraisal Form

Position: *Director of Research and Product Engineering* Applicant interviewed: *Samuel A. Jones*

Special comments to interviewer: This person must supervise directly 35 to 40 engineering technicians at the San Francisco plant, 25 to 30 people in Portland, and 10 to 15 people at Oshkosh. Approximately 2% of gross sales dollars will be budgeted for research engineering. This executive must be able to interest people in working together harmoniously and effectively. He must be able to act as both a line and functional executive. He should have the social poise and bearing that would impress customers, associates, competitors and others. He will need patience, perseverance, understanding and tact.

	Factor	*Special requirements of the position*	RATING (Check one) Outstanding	Good	Fair	Poor
1	*Personality:* Effect on other people as a result of his disposition, tact, enthusiasm, sincerity and sense of humor. Does he have self-confidence or does he lean on others? Leadership examples in school, work, play. Is he emotionally stable?	For this position, the candidate must be a leader, must be attractive to others, and they must respect him as a person as well as for his technical ability. (A contrast to most pure research personalities!)				
2	*Appearance:* Neatness, physical characteristics. Does he make a favorable first impression? Would you be happy to introduce him to customers, your associates, the Board of Directors?	Should make favorable impression under all kinds of circumstances—with his own technical staff and with the staff engineers of customer organizations. Must be in good health for travel and job demands.				
3	*Attitude:* Toward employment, former employers, associates and free enterprise. His character—does he give evidence of integrity? Does he differentiate between right and wrong? Will he take a firm stand?	Should be flexible and should understand others' viewpoints. Should be sensitive to others.				
4	*Technical knowledge:* Understanding of all phases of his field and related matters. Does he discuss his specialty with confidence? Has he developed a broad point of view toward his field of specialization?	Should be a competent administrator and organizer in engineering and research field.				
5	*Judgment:* The degree to which decisions or actions have been sound. Does he evidence common sense? Has his business and personal record indicated good judgment?	Should have a high order of sound judgment; should be mature and decisive.				
6	*Analytical ability:* Ability to size up a problem, evaluate the facts, reach sound conclusions and present them clearly and concisely. Does he show mental ability and objectivity? Does he consider new ideas? Is he quick in understanding new and complex ideas? Does he make emotional decisions?	Should have a logical and analytical mind; should be highly intelligent and think quickly.				
7	*Imagination:* Vision, foresight, creativeness and resourcefulness. Has he demonstrated a capacity for evolving new possible solutions to problems? Does he have a highly developed intellectual curiosity?	Should be creative and very resourceful. Should be able to plan far ahead and realize consequences.				
8	*Initiative:* Ability to originate or develop constructive ideas and to take necessary steps to get things done. Has he demonstrated initiative, persistence, and aggressiveness? Does he have the capacity for hard work? Will he accept responsibility and follow through?	Should have a great deal of drive and persistence. Should know how to get others to act in a coordinative way.				
9	*Ability to express self:* Faculty for written and oral expression —use of words, diction, simplicity, clarity, logic and forcefulness. Does he talk to the person or to generalities? Does he talk *down* or over people's heads? Does he have the basic ingredients to be a writer or speaker?	Should speak and write easily and fluently—no heavy foreign accent.				
10	*Potential:* Future promise for the X-Y-Z Corporation.	Should be up to date in his field and interested in self-improvement. Needs poise, maturity and sophistication.				

RECOMMENDATIONS:

(1) Should we employ this man? Yes..... or No.....

(2) If you have not rated him "good" or better in the above scale and yet recommend we employ him, state why:

Interviewer: .....

Date: .....

ask them to put their unconditional approval on these candidates.

Judged by the letter

The firm requesting assistance specifically asked that these resumés be submitted in letter form as organized by the candidate in whatever manner he chose. This gave the company an insight into the individual's organizational ability, some indication on what experience factors he considered most important, together with his ability to express himself in writing.

3. The company's management promptly acknowledged all applicants' letters. They replied directly to all candidates whose resumés had been submitted, sending the assisting companies a carbon copy. (Too often the assisting firms are left uninformed of the progress of the company's recruiting program.) Those whose experience and personal characteristics seemed to be best suited for the position were sent a folder of information. This folder included:

(a) Several pieces of background information on the company and its products.

(b) A summary of the job which included its shortcomings as well as its advantages, such as the amount of travel involved, approximate size of the department's budget, etc.

(c) Some descriptive material on the town and area in which the individual would reside.

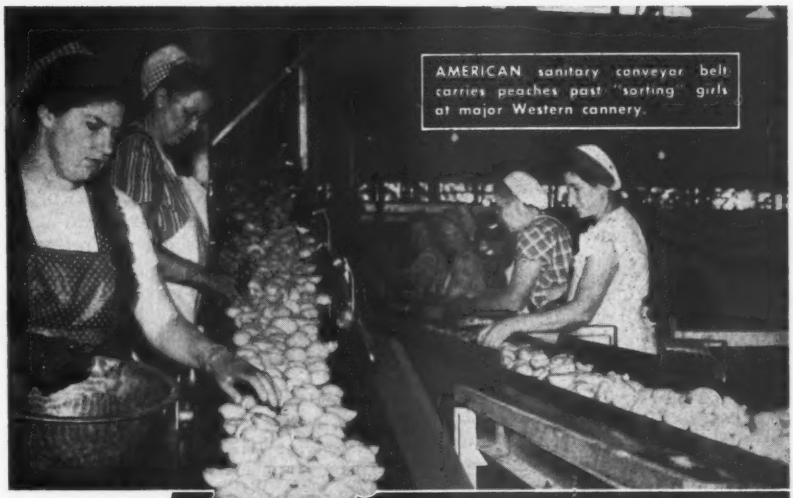
They asked the candidates to review this material carefully and to ask for additional information if they so desired. A comprehensive application form was enclosed. This called for all of the normally desired information plus a series of weighted questions which were designed to test the applicants' qualifications for the particular job.

Benefits derived

The company realized that there are several benefits in supplying the candidates with sufficient information for a sound decision. Such benefits included:

(a) The better qualified candidates would be attracted by the company's well-thought-out and frank approach to the problem. It is readily recognized that good executives are not in oversupply. Therefore, successful recruiting demands an alertness to such varied benefits as living conditions, compensation programs, sound company organization and other similar appeals.

(b) The job jumpers—who are always ready for a move—would recognize that the company knows what it wants and that it will have a system-



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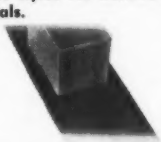

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D. Elevator belts are tailored to your job conditions for longer service, lower cost.

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atic and sound selection program. Respecting these facts, the poorer candidates would disqualify themselves at an early stage.

(c) Supplying this information would have public relations value—especially in dealing with executive personnel who may later influence the use of the company's products.

4. They conducted preliminary screening checks. The candidates' references were checked, using a prepared checklist, and personal interviews were then arranged for the better candidates in the group. The others were immediately informed by letter that they were not being considered further. Reasons were given wherever they could be based on facts indicated in the returned application form.

Interviewing methods

5. They conducted the first interviews in the field. Executives who were qualified interviewers were asked to conduct interviews of desirable candidates while traveling on other company business.

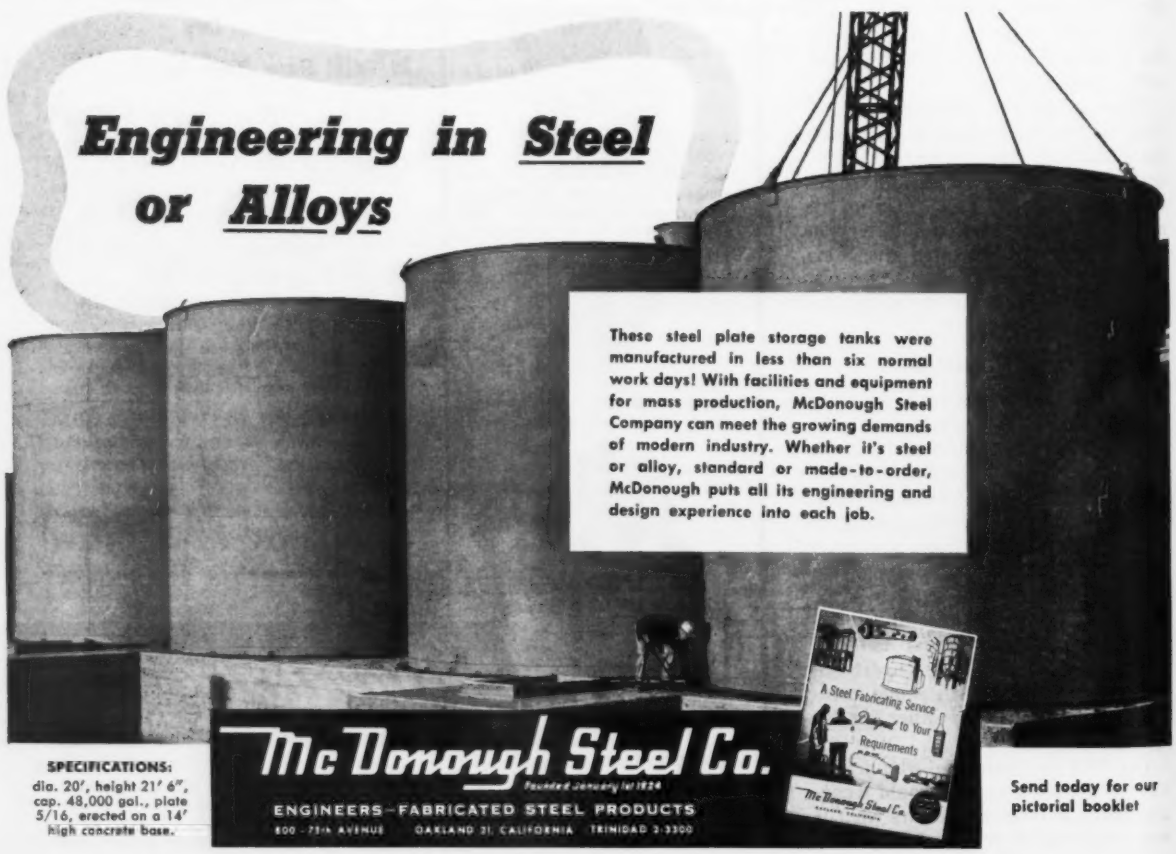
The preliminary interviews were planned to bring out specific answers, in an informal manner, to questionable points indicated in the application forms, the reference checks and the peculiar qualifications for the job as set forth on the "Interview Appraisal Form." This form was devised to allow for a common basis of rating by all company interviewers, and to measure the man against the position specification and not against the interviewer's personal qualifications for a successful executive. Also, since the position included a requirement to meet with their customers' engineers, one of

References

Suggested "✔" list for a telephone reference check.

Introductory and explanatory remarks: This is Mr. ..... of the X-Y-Z Corporation. Mr. ..... has given us your name as a reference. We are considering him for our position of ..... Could I take some of your time now, or would it be more convenient to discuss this at a later date?

1. How long have you known Mr. ..... and in what capacity?
2. What were his job duties, salary, and dates of employment?
3. Were the quantity and quality of his work good? Did he organize his work and carry it out with dispatch?
4. Does he have the technical knowledge sufficient to carry the responsibilities of ..... position?
5. What is his attitude toward the various grades of supervision—below, same level and above him?
6. Is he open-minded in his discussions with others?
7. Is he versatile? Can he be depended upon to use initiative and to carry a problem situation through to completion?
8. Does he have good capacity for further growth?
9. Does he have any outstandingly poor personality traits? How is he regarded by his associates?
10. In your opinion, what are his principal weaknesses or shortcomings? (Everyone has some weakness!)
11. What are his most favorable characteristics?
12. Do you know his wife—her education—social pursuits?
13. Do you know of his home life? Does he live within his means—stable home environment—close family unit—etc.?
14. Would you recommend any other coworkers of Mr. ..... that we might contact?
15. If a suitable vacancy occurred in your organization, would you hire (rehire) him?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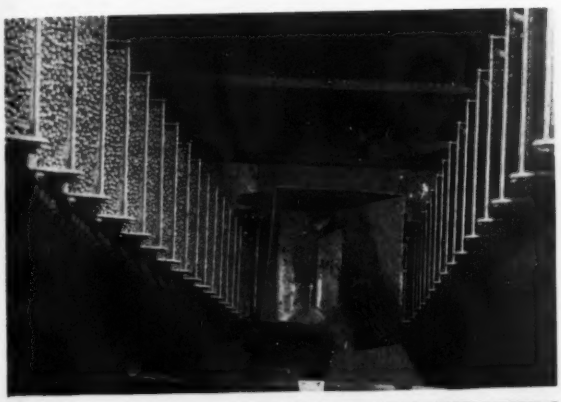
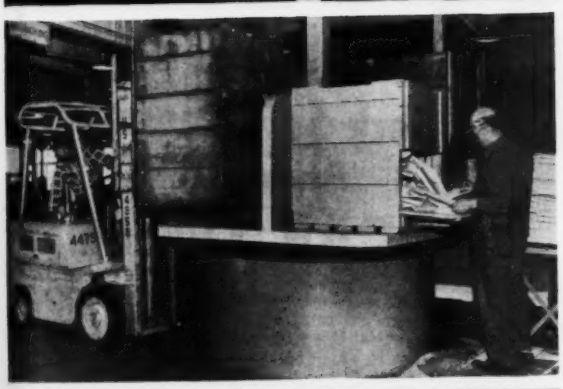
SPECIAL ISSUE

MATERIALS HANDLING

AUGUST 1954





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CHOOSING YOUR NEXT EXECUTIVE

. . . Begins on page 78

the meetings included a luncheon or other social situation.

6. They required psychological tests. The psychological testing was supervised by an independent psychologist. The psychologist was given all of the application material completed by the applicants together with the company's written specifications for the job. This was done so that the psychologist would have a standard for measuring these individuals. There is no such thing as testing an individual's goodness or badness per se. Testing shows his degree in relation to a specific set of requirements, e.g., a poor salesman, but a very competent laboratory technician!

Use of psychology

More and more companies are using psychological tests as an aid in selecting all personnel. The tests provide supplementary information of value in appraising new people. But, of course, they must be used with caution and only as one of the tools of selection. It is imperative to remember that psychological tests are to be seen but not overheard!

Psychologist's interpretations of these tests were used in three ways:

(a) To evaluate the candidate's tested capabilities for doing the job, such as his intelligence, aptitudes, proficiencies, vocational interests, and temperament. There is often a big difference in what a man is able to do —as indicated by the tests—and what he will do on the job. His past job performances will best show his zeal, ambition, loyalty, responsibility and energy. His past performance is determined by his answers to the application form, through personal interviews, the reference checks and by physical examination.

(b) To correlate the test interpretations with the application forms, interviews and reference checks. At this stage, all major discrepancies in these processes should be rechecked.

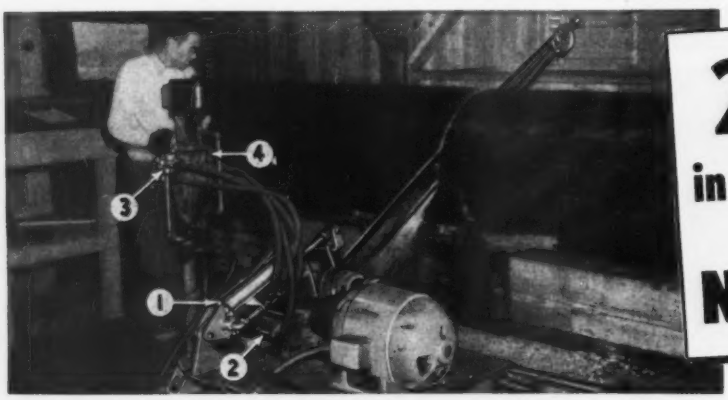
(c) To highlight areas for further training and guidance by the company, and areas where his work will have to be complemented by that of his assistants or other company personnel. No man is perfect. All things relative, the compromises are made in the areas of least importance to the company.

7. The senior executives made the final selection. The final three candidates were invited (separately, of course) to the company's general office and main plant, where they were shown the facilities firsthand, questioned against the background of the company's actual operation, and where further interviews were made by other company executives. The final selection was made by having all the senior officers meet and consider the candidates' previous ratings plus the test analyses and other information.

Orientation

8. They oriented the new employee with a planned program. The selected executive was given a planned orientation to the company and his position. The company realized that once he was given the full responsibility for his job, his time and freedom for viewing the rest of the company's related activities would be limited. Consequently, he was not immediately assigned to specific organizational duties and responsibilities, but was introduced to the company by a well-planned indoctrination program. This program enabled him to develop a friendly relationship with the other department heads and to better appreciate their respective organizational problems.

The more a new man is made to feel a part of the team, the easier it is for him to adjust to its tempo and to add his own best efforts.



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QUALITY CONTROL

. . . Begins on page 44

An inspector's instruction card form was drawn up and one of these made out for each part to be inspected. Dimensions to be inspected on each part were copied onto the card, and opposite each dimension the sampling plan to be used noted. Any special instructions with regard to inspection were listed at the bottom of the card, as well as special troubles attributed to the part.

This system put sampling on a standardized basis. At the same time it provided for a feedback of assembly troubles to the inspection department and brought engineering knowledge to bear on the question of which dimensions were critical.

A major quality control problem area is the relationship between receiving inspection and the material review function. This boils down to what to do with nonconforming parts. It is not as easy as it may sound for we have worked out no pat solution. Sampling plans simply tell you to reject a lot when it appears that nonconforming parts will exceed the acceptable quantity level, but you still have to decide what to do with these lots as between several choices:

1. Accept the lot in spite of nonconforming parts in the sample. This is what you would do if the nonconforming parts were functionally satisfactory and needed in production.

2. Reject the lot to the vendor on the basis of the nonconforming parts. This is what you do if they are not usable functionally or not urgently needed. You also might want to put pressure on the vendor to improve his quality.

3. Screen the lot yourself and send the bad parts back to the vendor. This is what you do if the parts are not usable or urgently needed.

4. Screen the rest of the lot and rework the bad parts yourself. This is what you do if the parts are not usable but very urgently needed in production. This alternative can be costly, particularly if a precedent is established.

The real problem is to bring quality control and engineering know how into the picture in deciding on the usability of the parts. Information from Production as to the need for parts and information from Purchasing as to the difficulty of obtaining more parts, should the present lot be rejected, are also of paramount importance.

The basic fundamentals are all generally applicable in small plants, whether yours is a jobshop operation or single product plant.

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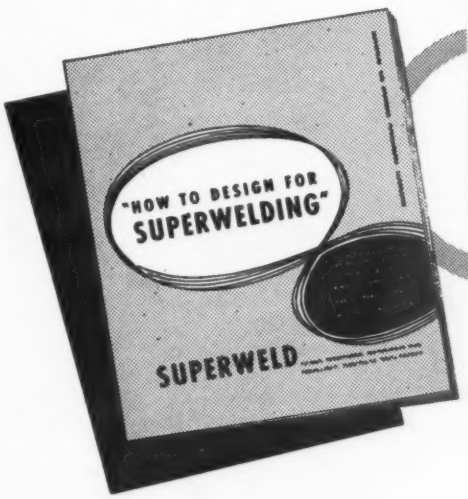

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FILMS & FILM STRIPS

Surface grinding

A 31-minute 16-mm. sound-color film, "Techniques of Surface Grinding," discusses operating methods and design factors necessary for good results in surface grinding. Film shows that equipment today minimizes the responsibility of the operator and increases the responsibility of the machine. Valuable operating hints, some of them illustrated with photomicrographs of grinding particles, are given. The film points up the possibilities of automation in surface grinding, a means of mass producing intricate precision parts with good finish at low cost. Film is available on free loan from The DoAll Co., Des Plaines, Ill.

Precision-molded rubber

Filmed to interest both technical and lay audiences, this 20-minute 16-mm. sound-color movie gives the complete story on production of molded rubber parts, from design to shipping room. Production sequences were taken in Acushnet Process Co. plant. Film is available by written request to Karl P. Goodwin, Vice President, Acushnet Process Co., 114 Middle St., New Bedford, Mass.

Human relations

Series of three human relations training films for foremen is available from National Safety Council, 425 N. Michigan Ave., Chicago 11. "Fragile —Handle Feelings with Care" shows how a foreman learns to value and respect the feelings of his workers. "Call 'Em on the Carpet" shows methods foremen can employ to correct workers' faults without incurring ill will. "It's an Order" illustrates the importance of giving understandable orders. Films run 12 minutes and are issued in 16 mm. sound movies as well as 35 mm. sound slidefilms.

Welding rod and electrode techniques

Sound-color film "New Welding Procedures," produced by Eutectic Welding Alloys Corp., is a fully explanatory step-by-step film on welding procedures. Latest developments in torch and metallic arc welding are shown and special production prob-

lems illustrated. Entirely a technical motion picture, film contains no promotional material. It is available without charge to technical societies, schools and colleges, and plants, from Eutectic Welding Alloys Corp., 40-40 172 St., Flushing 58, N. Y.

Welding safety

New 20-minute sound slide-film, designed for training employees, shows factors affecting safety in operating oxyacetylene welding and cutting torches and cutting machines. Titled "The Guy Behind Your Back," film uses cartoons and an easy-going narrative. Copies of the film may be purchased for $15, or it may be borrowed without charge, by arrangement with local offices of Air Reduction, or Air Reduction Pacific Co., 220 Bush St., San Francisco.

Modern mining

A 20-minute sound-color film release, filmed underground at Colorado School of Mines properties, shows new mining methods using Thor sinker leg, stoper, air column, air bar feed and power feed drifter machines. Film, second in Thor's new series, is available for showings in Denver, Salt Lake City, Los Angeles and San Francisco; all bookings must be scheduled through local offices of Thor Power Tool Co.

Aluminum brazing

A 22-minute 16-mm. sound film, titled "New Horizons in Aluminum Brazing," not only shows what can be done in joining parts by brazing, but shows how to do it. Examples show how Alcoa's aluminum research laboratories have teamed up to pioneer novel applications of brazing process and new brazing tools and methods. Film can be borrowed by written request on business letterhead to Motion Picture Section, Aluminum Company of America, 854 Alcoa Building, Pittsburgh 19, Pa.

Aluminum welding

A 28-minute 16-mm. color film describes and illustrates aluminum welding using tungsten arc and consumable electrode methods. The viewer is also taken on a brief tour of Alcoa's research and process development facilities. "Welding Advances with Aluminum" can be requested for loan by writing on business letterhead to Motion Picture Section, Aluminum Company of America, 854 Alcoa Building, Pittsburgh 19, Pa.

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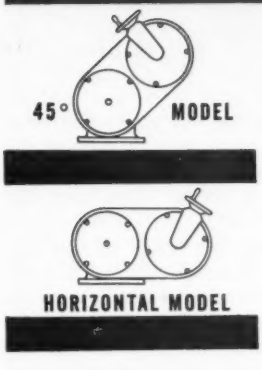

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Estimated useful life	8 years	5 years	10 years
Available for payout (Annual income—annual out-of-pocket expense)	$2,250 per yr.	$2,500 per yr.	$3,000 per yr.
Payout period	2.2 years	2.0 years	2.0 years

IS THE PAYOUT PERIOD a safe investment guide?

Survey seems to indicate that the method has its weaknesses

By E. PAUL DeGARMO

Professor of Industrial Engineering
University of California
Berkeley

A RECENT research study at the University of California* revealed that more small and medium sized businesses in the San Francisco Bay Area make their investment decisions upon the basis of the "minimum payout period" than upon any other criterion.

While this fact alone will be surprising to many people, further investigation revealed a more surprising and disturbing fact. It appears that a considerable portion of those who use this method frequently are arriving at erroneous conclusions as a result of its use.

In many cases they are not aware of the fact that direct use of payout values alone, without consideration of other accompanying factors, may not lead to the result that they desire, which is the selection of the most profitable use of their available capital.

Usage widespread

While the study mentioned previously was confined to the San Francisco Bay Area, there is considerable evidence that small and medium sized businesses throughout the United States also make extensive use of the payout period method. Two of the reasons which were uncovered for the widespread use of this procedure were well-known and not surprising. These were: (a) the simplicity of the procedure, and (b) the fact that no de-

*F. M. Gonzales, "Evaluation of Investment in Production Facilities," M.S. thesis, University of California, 1953.

TABLE I

Rate of return for three assumed investment alternatives

	A	B	C
Income minus out-of-pocket expense	$2,250	$2,500	$3,000
Annual depreciation (8% sinking fund)	470	853	414
Net profit (before taxes)	$1,780	$1,647	$2,586
Rate of return on investment	35½%	33%	43%

preciation method has to be used in the calculations.

The third reason was somewhat more difficult to uncover and is more surprising to most people. It can perhaps best be stated in the words of one company owner:

"I have only a very limited amount of capital available. There are a dozen opportunities available to me for using any spare capital I have. I want to put my funds into that alternative which will enable me to get my capital back the quickest so I can reinvest it in another opportunity."

Quick recovery sought

Subsequent inquiry made it clear that this desire to recover invested capital as quickly as possible was at the root of most of the investment decisions based upon the payout procedure. This subsequent inquiry made it clear that the persons using this method were not aware of the fact that in many instances its use could give erroneous results.

Ordinarily, the payout period is computed as follows:

$$\text{Payout period} = \frac{\text{Required investment}}{\text{Estimated annual income—annual out-of-pocket expense}}$$

The example stated at the beginning of this article illustrates the possible results of this method of computation in a typical situation.

From discussions with those who use the payout method, it appears that most would choose alternative "B," chosen over "A" because it has a shorter payout period. Similarly, it would be chosen over "C" because it involves a lower investment. At a glance the choice of "B" over "A" or "C" seems quite logical. However, let us examine it a little more thoroughly.

Facts to consider

In the problem, as given, one very pertinent set of facts is ignored completely in determining the payout period. The estimated useful life of the alternatives does not enter into this calculation. That this factor has a very important effect in problems of this kind, and therefore should not be neglected, can be shown by the data in Table I, where the actual rate of return earned by the invested capital for the various alternatives in the previously mentioned example is computed and shown.

From this table it may be seen that while the payout periods for all three of the alternatives were nearly the same, the actual earning effectiveness was quite different for each. From the viewpoint of the likelihood of the investment to produce profits, alternative "B" is the least desirable, and alternative "C" is far better than the others.

Some will say that when investment studies are made of alternative machines or structures for doing a *given* job, considerable differences in expected useful lives are usually not encountered, and thus no great error is introduced through using the payout period method without regard for differences in life. Or, similarly, that the particular resulting product will be produced over only a relatively short period so extra equipment life is of no value. While this is true in a substantial number of cases, it is not true in many instances and no great reliance should be put on this idea.

Life expectancy important

Many companies appear to use the payout method in comparing two or more entirely different investment ventures. For example, should capital be invested in equipment which will enable a company to expand and produce product "X"; or should it be invested in entirely different equipment which would enable them to

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HERE'S AN EXAMPLE

Hot foods, hot coffee on the way to Cannery workers in the field to save time lost bringing workers in for meals.

produce an entirely different product "Y"?

Products "X" and "Y" may have entirely different sales characteristics and the equipment required for one may be very different from that needed to produce the other and have an entirely different life expectancy. If the differences involved were like those for alternatives "B" and "C," discussed previously, one can hardly conclude that the expected life of the equipment is not pertinent.

Another reason sometimes given for neglecting estimated life differences in using payout period results is somewhat as follows: "We require all new equipment to pay off within X years." It is assumed that, since all equipment is required to pay out within a certain fixed number of years in investment studies, this takes care of the matter.

Fallacy exposed

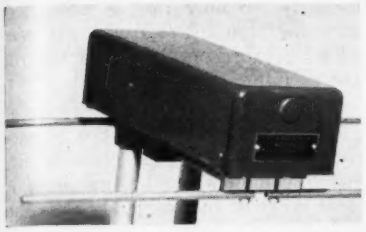
A little thought, of course, reveals that this is not true and that such an assumption gives no information concerning which of two alternative investments is the better if they actually involve different lives. An assumption that two pieces of equipment have identical lives does not make them do so.

It can easily be demonstrated that in a *given* investment situation all alternatives having the same expected service lives and the same payout period will produce the same rate of return. However, if the useful lives are different, one can not rely on computed minimum payout periods as the basis for making investment decisions.

Similarly, if the alternative investments concern entirely different products, or situations, it is most likely that different equipment lives may be involved and simple payout period values will lead to erroneous results. It is, in general, desirable to be able to finance as many projects as possible by obtaining rapid recovery of one's capital.

There is no advantage, however, in embarking on two successive two-year projects, each of which will yield a return of 20%, instead of undertaking one four-year project which will yield a return of 30%. Therefore, check your investment alternatives to see whether they have different expected lives.

If they do, do not rely solely on simple minimum payout calculations! Use some other method of comparison, such as "rate of return upon the required investment" or "minimum annual cost," wherein life expectancy is given proper consideration.



DETECTOR UNIT of the electronic alarm (above) "feels" movement of any solid body within a magnetic field and transmits a signal to the resolver (bottom) for appropriate action.

ELECTRONIC ALARM for industry

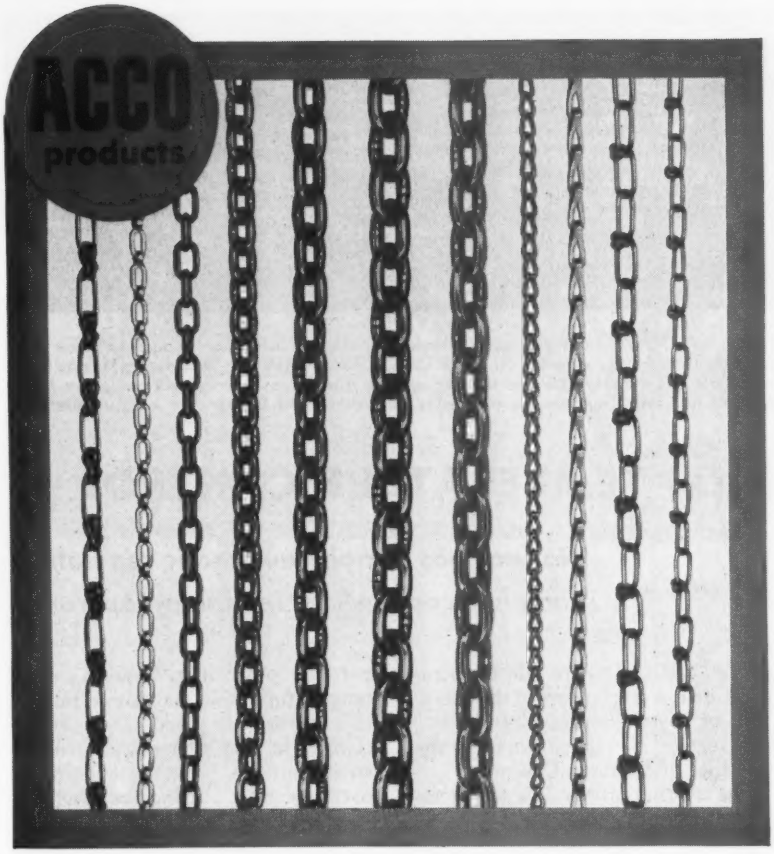
AN ELECTRONIC alarm having industrial application is being manufactured and distributed by King Electronics Co., Albuquerque, N. M.

It operates on the principle that a disturbance in a magnetic field can be registered at the power source, making possible such uses as controlling machinery for automatic operation and for safer operation of machines. The alarm can be adjusted to shut off a drill or press if the operator's hand comes within a given danger area.

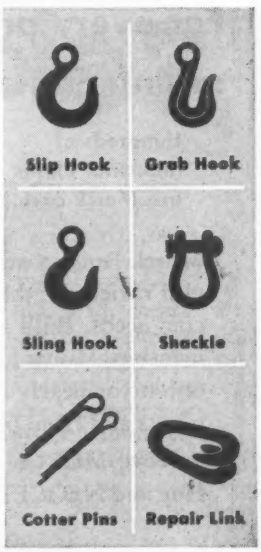
What it's made of

The Whitlow UHF alarm consists of two small units, a detector and a resolver, each about the size of a cigar box. An ultra high frequency magnetic field is established by the detector, and this feels the movement of any solid body within the field and sends a signal to the resolver, which may be in another room. The resolver then turns the impulse to the desired ends, ringing a bell, blowing a siren, turning on a floodlight, or lighting a bulb at a central station.

The apparatus operates wires or tape and detects the movement of a human body, sends a signal if the fire sprinklers turn on, if power fails, or if its own wires are cut. The magnetic field may be adjusted up to 75 ft. of spherical coverage, or the field may be enlongated to run along a fence. It can also be shortened to only a few feet in length.



Chain and Attachments for your every need



• Your own experience has shown you the vital importance of selecting exactly the right chain and attachments for each specific end use. AMERICAN makes all basic chain patterns so that you can get from one manufacturing source the best and most economical chain for your every requirement.

Whether you need chain for general service, for heavy (or light) duty, for logging, or for some unusual application—you can count on AMERICAN CHAIN every time! Welded chain or weldless chain—you'll find the same high quality in both. Also, a complete line of AMERICAN-made attachments for any type or size of chain.

Call your AMERICAN CHAIN distributor. He stocks many popular chains and will gladly advise you on your needs. Or—write our York office.

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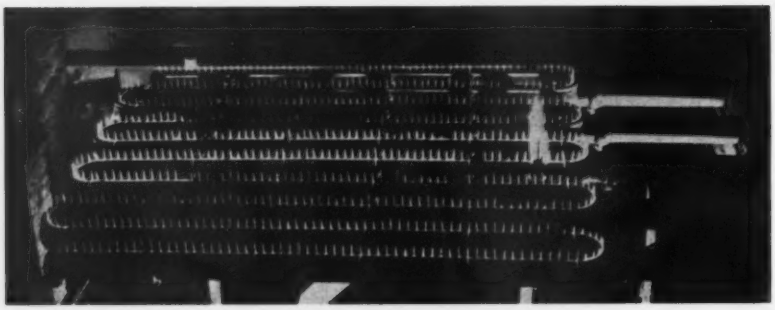

LOOKING DOWN on a gas burner installation from inside the kiln. Note brick combustion chamber for standby oil firing. Combustion chamber is not needed for gas firing since air to be heated passes up through the gas flame. Second burner in the background has only first section of burner on, foreground burner has both sections on.

KILN TEMPERATURE CONTROL

Natural gas permits automatic regulation, complete combustion, in malting operation

CONTROLLING of kiln temperature is a crucial part of the operations of the California Malting Co., Los Angeles, suppliers of malt to the breweries of Southern California.

The malting process is a time-temperature proposition requiring exact temperatures to be maintained for specific periods of time. Most recent change in the temperature control equipment has been the addition of natural gas for heating the kilns. Oil, formerly the only fuel, is now used only for standby. Natural gas was added because of its ease of control and cleanliness.

Automatic temperature with natural gas is possible because it can be correctly ratioed with the primary air, giving complete combustion over a large range of fuel demand. Thus the maltster's problem of stain or discoloration on the grain is eliminated.

A complete control system has been installed as a result of the switch to natural gas, designed and installed by Swanson Engineering Co.

Components

The control center consists of one Foxboro cam temperature control cycle transmitter; two Foxboro temperature controllers; one Minneapolis-Honeywell kiln temperature recorder; start and stop buttons for burners and fans; Foxboro fuel gas flow and press recorder and a Hays draft gauge.

The Foxboro cam temperature control cycle transmitter determines the time-temperature relationship of the lower kilns. One Foxboro temperature recorder is connected to a thermocouple in the back side of the lower kiln, and another is connected to a

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thermocouple in the front side. The temperature of the upper kilns is controlled by opening and closing the dampers between the kilns.

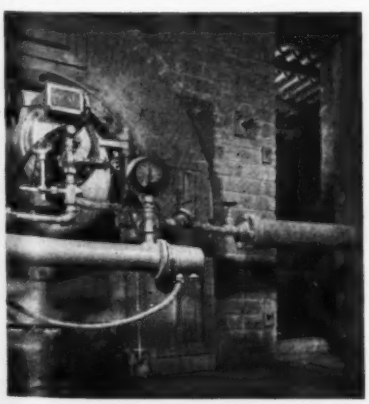
The radiant heat from the refractories is not important in the combustion of a proper mixture of natural gas and air. Therefore, a Maxon premix linoflame was installed between the existing refractory furnaces. This has the advantage of eliminating the refractory wear during gas firing.

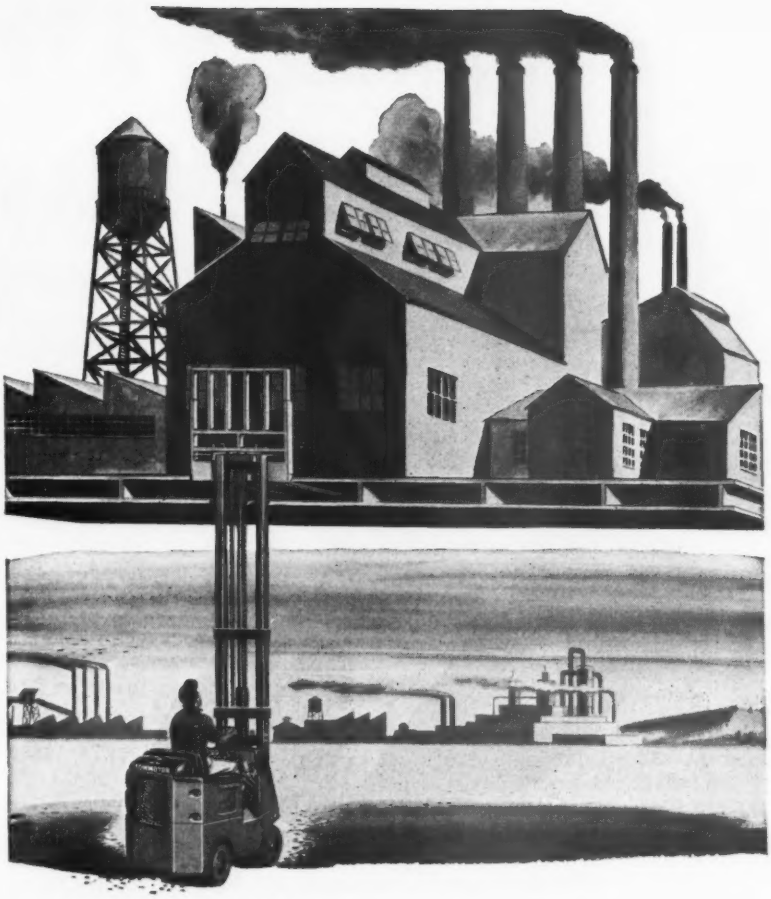
There are a total of four Maxon linoflame burners. One CBH 5800 Maxon blower supplies each burner through two Maxon premix multi-ratio proportional mixers. The linoflame burner is divided into two sections. One section is supplied through the No. 500-C multi-ratio proportional mixer while the other section is supplied through the No. 300-B multi-ratio proportional mixer. They are separately controlled. A gas pressure regulator is connected to each multi-ratio proportional mixer to reduce the gas pressure from 3½ psi. to 9 to 11 inches water column pressure.

Each burner assembly is provided with a MHR 190-B Flame failure relay complete with flame rod, solenoid valve, spark transmitter, and start button. The flame failure device is connected to a Maxon safety valve.

The amount of gas input is controlled by a No. 6 and No. 8 Foxboro diaphragm motor with integrally mounted valve actor. These are pneumatically controlled. The first section of the linoflame comes on first, and the second section comes on when more gas is needed. All four burners are interconnected so they do not come on at the same time. The turn-on points are staggered and the rates of increase from low to high fire are also slightly different for each burner. This gives a very smooth, steady temperature control.

GAS BURNER installation over the Ray No. 5 oil burner with air inlet louvers removed.





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The impossible is obvious . . . but perhaps you are missing some of the many possible TOWMOTOR applications around your plant. Besides receiving, warehousing, and shipping, TOWMOTORS can also save time, labor, and money on maintenance jobs. Lifting workmen to high walls and ceilings. Moving heavy machinery when and where needed most. With dozens of special attachments, TOWMOTORS speed production—change unwieldy dies, shake out annealed castings, pour chemicals into vats . . . handle every conceivable shape and material! Let us show you how much *more* TOWMOTOR can do and save for *you* . . . send for "Towmotor Portfolio for Executives." TOWMOTOR CORPORATION, Div. 6705, 1226 East 152nd St., Cleveland 10, Ohio.

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Mr. Hood and his associates may well be proud of the Steel Corporation's Payroll Savings figures:

- 144,000 men and women of U. S. Steel are enrolled in the Payroll Savings Plan—an over-all employee participation of 52%—excellent for a company as large as U. S. Steel.
- the average monthly investment of a U. S. Steel Payroll Saver is $20.79.
- every month, these 144,000 employees invest $2,993,760 in personal security—and America's economic stability.
- in some U. S. Steel plants and subsidiaries employee participation runs as high as 80%.

Nearly eight million men and women, in forty-five thousand companies, large and small, are building personal security and contributing to national economic stability by their $160,000,000 monthly investment in U. S. Savings Bonds. These Payroll Savers, with their $25 and $50 Bonds, are major shareholders in a huge reservoir of future purchasing power—the $35.5 billion, *cash value* of Series E Bonds outstanding.

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WESTERN INDUSTRY

NEW EQUIPMENT & MATERIALS

USE RIP-OUT POSTCARD for more information on products introduced this month

1

Towing tractor is redesigned

Basic dimensions of Clarkette 5 towing tractor have been retained in a redesign offering greater driving safety, comfort and simplicity. Driver platform has been lengthened, control lever altered to reduce hand fatigue, center control linkage moved to lower cross bar, and exhaust pipe relocated to right front side of truck. Engine is now equipped with revised piston rings and aluminum pistons. *For more information circle key number on rip-out postcard.* Clark Equipment Co.

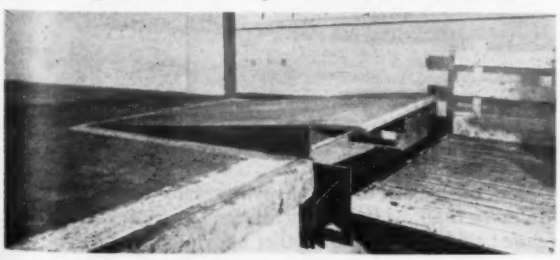
2

New patents on Halfco bearings

Further patent applications have been made on newly discovered method enabling ball and race to maintain a contact area of more than 90%. New manufacturing processes make it possible to produce Halfco bearings in materials and heat ranges formerly not available, resulting in introduction of stainless steel outer race at 160,000 to 180,000 lb. tensile strength. *For catalog with information on complete bearing line, circle key number on rip-out postcard.* U.S. Bearing Corp.

3

Balancing dockboard adjusts itself to truck bed



Simple, mechanical Hi-Lo dockboard works like this: As a truck backs into shipping dock it actuates dockboard's extended operating lever, ramp falls into position. No hydraulic, pneumatic or electrical mechanism is required. Several Hi-Lo models are available, including units for installation in new or rebuilt docks and a packaged unit built to a specified dock height and shipped ready to operate after hanging counterweight. *For detailed folder, circle key number on rip-out postcard.* Dockboards, Inc.

4

Flow gun for sealing compounds

New Model 31 precision flow gun applies sealing compounds such as asphalt, rubber cement and similar heavy materials. It can be used to seal gaskets, mouldings, cracks, corners and crevices on auto bodies, refrigerators and other products. No atomizing air is used. A choice of 16 nozzles with various sized orifices is offered, as well as a special Model 31V for spraying abrasive materials in ceramic field. *For complete information circle key number on rip-out postcard.* Binks Manufacturing Co.

5

"Off-the-shelf" line . . .

. . . of Taper-Lock sprockets is now extended to include 1½, 1¾, and 2-in. pitch sizes. This means that users of single strand roller chain will now be able to secure sprockets and bushings for chain sizes from 40 through 160 direct from distributors' shelves ready for immediate installation and without delay for reboring, keyseating, drilling and tapping. *For literature giving sizes, weights, dimensions, and list prices, circle key number on rip-out postcard.* Dodge Manufacturing Corp.

6

An abrasive for irregular surfaces

Grind-O-Flex multiple wheels, each wheel made up of many abrasive leaves, are designed for smooth finishing of work with contours and irregular surfaces. Multiple wheels may be made in any combination of sizes in inch increments. Three to five wheels are recommended for portable work, but there is no limit for fixed installations. *For additional information circle key number on rip-out postcard.* Merit Products, Inc.

The man on the job likes Victor's

Using a VICTOR No. 310 torch butt with two S2 extensions and No. 8 type 4 tip, Joe Wyman (Shreve Welding Co., Oakland, Calif.) repairs cast iron heating boiler header with VICTOR No. 1 low fuming manganese bronze rod. Inset photo shows 5/64" build-up on undersize castings, done with same No. 310 torch but with No. 5 type 4 nozzle and VICTOR No. 6 square cast iron rod.

VICTOR'S wider work range pays off from the day you select your first VICTOR welding outfit on through a lifetime of reliable service. You buy the torch you need for your present work, add extensions, cutting attachments or special nozzles as they're needed. Result: top-quality equipment that's always perfectly matched to your needs!

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NEW EQUIPMENT . . . Begins on Page 95

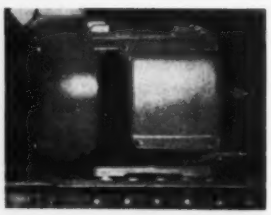
7

Heat treating baths

Holden salt bath equipment is claimed to result in savings through reduction and, in some cases, elimination of distortion. Also shorter time cycle and less floor space are needed in heat treating processes. Holden research department offers to process representative parts for interested companies in order to establish tolerance limits and estimate final savings. *For more information circle key number on rip-out postcard.* A. F. Holden Co.

8

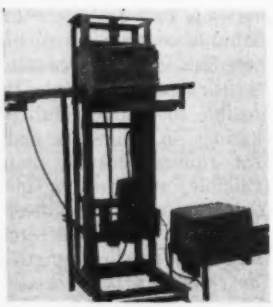
Hp. output doubled in this line of motors



Life-Line "A" series now being produced by Westinghouse is said to represent all advances made in electric motor industry during past 25 years. In some models, hp. rating is doubled while physical dimensions remain same. Key to size lies in improved design, new insulating materials, and more effective utilization of present materials. *For data, circle key number on rip-out postcard.* Westinghouse Electric Corp.

9

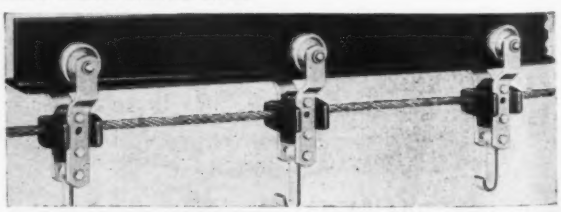
Production line elevator with a brain



Weld-Bilt production line elevators are fitted with solenoid operated selectors that automatically accept or pass by parts or packages according to weight or size. Power rollers on lifting platform, moreover, move load automatically, with direction-setting controls. Unit also operates on materials carried on a descending route. *For complete story circle key number on rip-out postcard.* West Bend Equipment Corp.

10

New cable has 30 lives



New Bush-Lock cable conveyor is said to increase cable life more than 30 times; facilitates lubrication to protect against acid, moisture and other hazards; and permits fast, easy maintenance and revision of installations. Bush-Lock trolleys feature cylindrical bushings permanently locked on accurate centers by high pressure swaging to preformed galvanized or stainless steel cable. Two halves of an

adaptor block, to which are attached trolley and load-bearing hook, are bolted around bushing. *For descriptive literature circle key number on rip-out postcard.* E. W. Buschman Co.

11

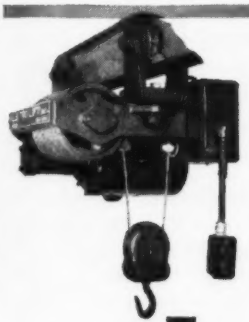
Low-cost pillow blocks for low-speed, light duty

Series JPS-200 ball bearing pillow blocks, available for shafts from 5/8 to 1 1/4 in. in diameter, are designed for applications where speeds are relatively low and loads are light. Precision deep-groove single row ball bearing, self-aligning in all directions, assures smooth operation and long life. *For folder of information circle key number on rip-out postcard.* Link-Belt Co. 2517

12

Two silicone release agents . . .

. . . for shell molders who wish to use solvent-type agents rather than water emulsions are identified as F-496 and F-452. Designed for use on deep draw, narrow draft patterns, they are said to leave minimum build-up, ease pattern cleaning, and provide multiple releases. Data sheet 5-106 gives additional details. *For your copy, circle key number on rip-out postcard.* Dow Corning Corp.



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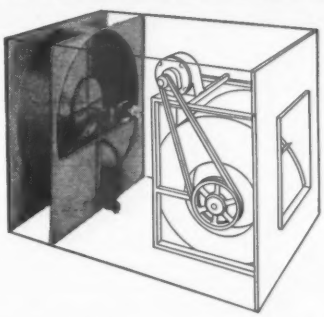

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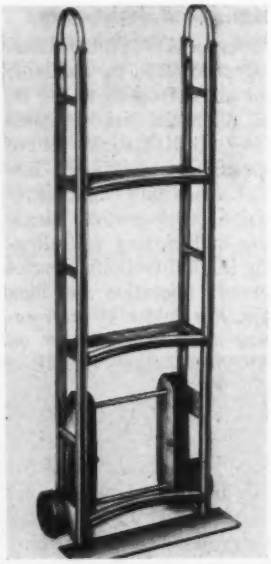
13

Stair-climbing appliance truck



Ezy-up Model B all-steel appliance truck has endless-belt stair-climber treads, consisting of 13 free-rolling rollers with an endless belt, which prevents frame from contacting steps. Each unit is furnished with 15 ft. web strap with patented, self-tightening buckle to hold load in place. *For full details circle key number on rip-out post card.* The American Pulley Co.

14

"Eye-rest" green belts for food handling

Included in a new line of lightweight food handling belts are two types in a green that is said to increase inspection efficiency by reducing glare and eye strain. Highseal belt resists moisture, food acids, most greases, fats and alkalies and will operate at temperatures up to 212 deg. F. Kleenseal, designed for low cost handling of fruits, vegetables, etc., remains flexible at low temperatures. *For complete information, circle key number on rip-out postcard.* B. F. Goodrich Co.

15

Manual welder takes rough treatment

Light-weight, water-cooled Heliweld holder is produced for welding thin gauges of aluminum, stainless steel, copper base alloys, magnesium and killed steel. Known as Airco H12A, it is insulated with tough plastic and completely water-cooled for safe operation. Holder is 7½ in. long, weighs 4 oz. It is rated at 125 amp. and can be operated on AC or DC power. *For literature giving details circle key number on rip-out postcard.* Air Reduction Pacific Co. 2300

16

New line of power system analyzers

I-T-E system analyzer is a compact design using 60-cycle power supply. It is said to offer high accuracy, speed of setup and operation, and low maintenance; a valuable aid in solving complex problems in expansion and interconnection of electrical power systems. *For details circle key number on rip-out postcard.* I-T-E Circuit Breaker Co.

17

Special line of bronze valves

Here is complete line of bronze valves equipped with Coradur stems, a new metallurgical development said to overcome corrosion and dezincification. Stem material, an aluminum-silicon bronze alloy, combines a favorable machining index with durability. *For more complete facts, circle key number on rip-out postcard.* American Chain & Cable Co. Inc.

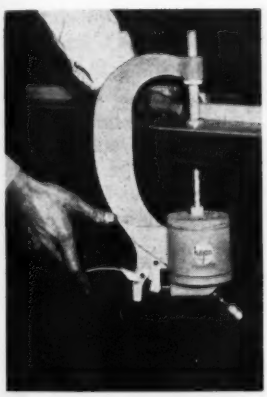
18

Low cost machine for dust-free blast cleaning

Vacu-Blast, Jr. is a new, moderately priced blasting machine for use in welding and painting shops and for general cleaning and maintenance uses. Operating advantages include: superior cleaning, dust-free blasting, compact design, and low operating cost. Only compressed air is needed to operate it. *For further information, circle key number on rip-out postcard.* Vacu-Blast Co. Inc.

19

Time-saving air-pressure C-clamp



Air-actuated C-clamp, manufactured in standard and special sizes, has air chamber and valve at base, instead of turn screw and handle. Clamp swings easily aside, and cut can be resumed without disturbing work or clamp. Self-adjusting head helps provide even pressure to avoid marring work. Clamp has 6-in. opening with 3-in. throat and 2-in. plunger travel closing to shut position, with 700 lb. thrust on a line pressure of 100 lb. *For more information circle key number on rip-out postcard.* The Burklyn Co.

20

Low-cost band machine offers versatility

A new line of 16-in. band machines with 12-in. thickness capacity for shop use is loaded with outstanding features and time-saving attachments. Engineered and powered for tough, straight or curved metal sawing operations, new DoAlls are claimed more than adequate for sawing woods, plastics and numerous other materials. *Circle key number on rip-out postcard for additional information.* The DoAll Co.

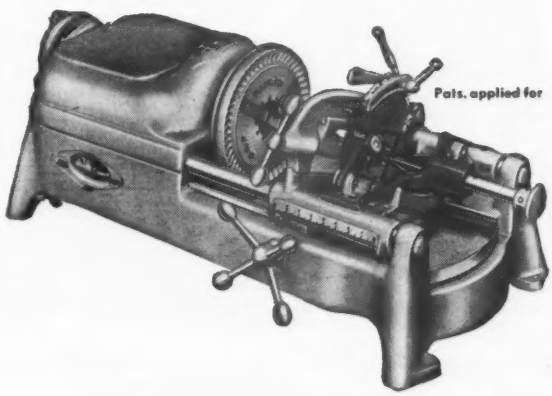
21

Super Barrel for heavy-duty barrel cleaning

Super Barrel is a new vapor spray degreaser in Baronet line designed for difficult jobs. Equipment comes complete with leakproof spray pump, motor, hose and lance for fast removal of oil and dirt from all metal parts. Available in both gas and electrically heated models. *For folder circle key number on rip-out postcard.* Baron Industries.

For Fast Bolt Threading
... it's the New 500A
RIDGID
with new "SPEED-GRIP" CHUCK

New principle...
not just another hammer chuck!



The bolt and rod threader that's fast!
Capacity ¼" to 2" bolts—pipe, too, ⅛" to 2"

You've got to see it and try it to believe it! Only 2 quick-opening die heads—small head for ¼" to 1" bolts, large head for 1¼" to 2" NC, to 1½" NF—to 2½" in 8N, 12N and 16N . . . easy die change, right or left hand threads, easy adjustment to over or under size. Special dies on request. This 500A threads any length bar to 2½" diam., makes studs with RIDGID Nipple Chuck, cuts off 5/16" to 1" rod. Independent operation of tools. Lots of power. New Speed-Grip Chuck guaranteed to hold rod or pipe securely *forward or reverse*—motor action makes it tighter. See it, buy it at your Supply House.

THE RIDGE TOOL COMPANY • ELYRIA, OHIO, U.S.A.

RIDGID
Work-Saver Pipe Tools

Conducive to Contentment!

BERGER MANUFACTURING DIVISION REPUBLIC STEEL CORPORATION CANTON 6, OHIO

STEEL LOCKERS

Keeping workers contented and happy is a terrifically important factor in good industrial employee relations. Furnish them with modern, sanitary lockers to keep their clothing and belongings safe, dry and clean. They'll really appreciate it. Berger lockers are very strong and have the portable unit design to fit changing needs. Available for quick delivery from local stocks. Call a Petley engineer to help you design plant locker layout and facilities.

OTHER BERGER PRODUCTS: Steel shelving, tool room equipment, steel lockers, office desks, work benches, files, shop desks, tables.

Representatives:
BERGER MFG. DIVISION
REPUBLIC STEEL CORPORATION

PETLEY INCORPORATED
INDUSTRIAL AND AUTOMOTIVE EQUIPMENT ENGINEERS

899-73rd Ave., Oakland 3, Calif.
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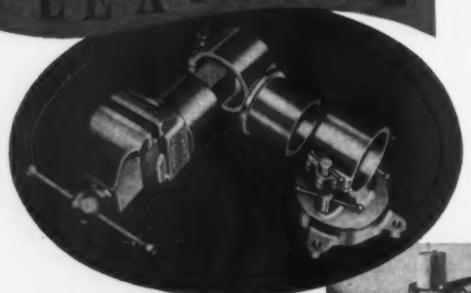
Phone: RAymond 3-3327

Anglo Bank Bldg., Fresno, Calif.—Phone: 3-4849

FLEXIVISE



A REVOLUTIONARY DEVELOPMENT THAT SAVES TIME, LABOR, FATIGUE

Provides complete rotation of 360° in any direction. Positions work to the operator saving time, labor and physical fatigue. Flexivise is exactly what the name implies: a flexible vise providing a greater range of uses, with more convenience and greater efficiency. 4" jaw width, 5½" jaw opening. Write or wire now for complete information.

Typical example of extensive flexibility.

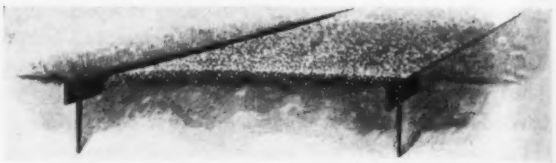
Flexisleeve attachment permitting work to be rotated in any position.

FLEXIVISE COMPANY
1149 E. Pico Blvd. - Los Angeles, Calif.

NEW EQUIPMENT . . . Begins on page 95

22

Steel curbing for well-groomed lawns and parking areas



"Estate" steel curbing made of ¼ x 5 in. steel is again available for edging roadways, lawns, parking areas. Curbing comes in 16-ft. lengths, with seven tapered stakes 18 in. long for each section, which are driven through pockets pressed into sides of curbing. Joints between sections accommodate inclines as well as level surfaces; curbing can be formed for curved boundaries. It is supplied with heavy coat of green paint. Illustrated folder describes curbing in detail. *Circle key number on rip-out postcard.* Joseph T. Ryerson & Son, Inc.

23

Power drive features wrenchless chuck

Rigid portable power drive for threading, cutting and reaming pipe with hand tools is now made with a new wrenchless Speed-Grip chuck. Guaranteed to hold any kind of pipe or rod securely both forward and reverse, this new "400A" power drive handles ⅛ to 2-in. pipe, ¼ to 2-in. bolts, and has ample power for geared tools to twelve in. *Circle key number on rip-out postcard for more complete information.* The Ridge Tool Co.

24

Free chart compares motor frame assignment standards

Here is a "Compar-A-Frame" chart to aid engineers and designers in quickly comparing old and new NEMA AC frame assignment standards. Chart will serve both as a tool for design and layout of new machinery, and as a handy reference for sales personnel who require a time-saving spot comparison of dimensions. *For your copy, circle key number on rip-out postcard.* Reliance Electric & Engineering Co.

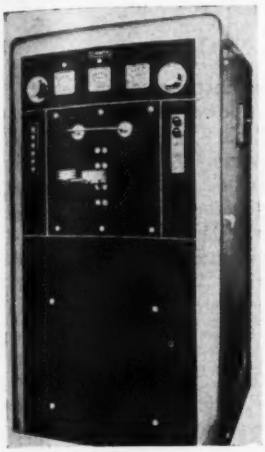
25

Backstand idler for low-cost grinding and polishing

The "61" universal backstand idler is a new low-cost attachment for all types of wall, bench and floor backstand grinding and polishing operations. It is adaptable to either heavy-duty production grinding or intermittent light polishing jobs which call for frequent setup changes. Belts of same length may be used with contact wheels of various diameters. Two models of the "61" are available: Model 432 for floorstand operations, and Model 431, for floor, wall or bench installation. *For a brochure of detailed information circle key number on rip-out postcard.* The Carborundum Co.

26

For soldering, brazing and light heat treating



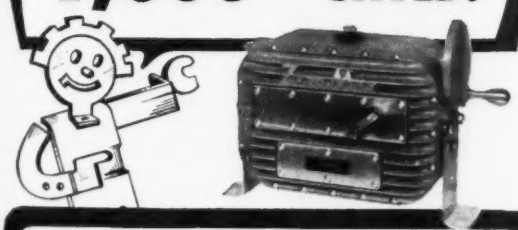
Redesigned 5 kw.-output high-frequency induction heating unit offers heavier sheet steel cabinet, relocated Checklite system of indicating lamps, reduced water consumption, an electrical interlock system to eliminate danger of work coil burnouts, and other improvements over old model. All operational controls are accessible from outside of unit. Additional details in Bulletin 1440. *For your copy circle key number on rip-out postcard.* Lindberg Engineering Co.

27

Precision non-inductive resistors

Available in exact resistance values to accuracies of 1, 0.5, and 0.1% a new line of K-F precision resistors is offered in a series of standard value ranges from 0.1 ohm to 1 megohm. Units exhibit low thermal emf. and a temperature coefficient of 0.000025 ohms per deg. C. They are wound noninductively on non-hygroscopic ceramic bobbins and impregnated for moisture protection. *Circle key number on rip-out postcard for more information.* K-F Development Co.

NEARLY
$7,000^{00} SAVED!



$597.50 SHORT-RUN TOOLING COST CHEAPER THAN HANDMADE MODELS—RISK MINIMIZED

. . . reported by Revco, Incorporated

A $7,500.00 permanent tooling outlay would have been necessary to produce two experimental models of a larger Revco "Zero-Max" variable speed transmission. Or make the pilot models by hand. The entire Federal tooling job cost $597.50, *less than what it would have cost Revco to make the models by hand.*

84 Accurately Stamped Parts Cost Revco Only $9.86 Per Transmission—11.8c Per Part—Using Federal's "Close Tolerance" Short-Run Stamping Process.

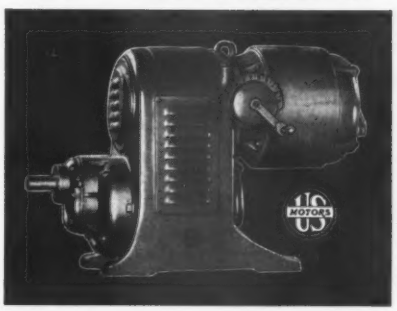
see our catalog in PRODUCT DESIGN FILE or write for copy

"The parts received from Federal," states Revco President, Richard G. Gray, "were as clean and as accurate as if they were produced on permanent tools."

Got a tooling or stamping problem? Complete information is contained in Bulletins 101 and 161. Write for them.

Federal TOOL AND MANUFACTURING CO.
1409 W. MAGNOLIA BLVD., BURBANK, CALIFORNIA
AND 3605 ALABAMA AVE., MINNEAPOLIS 16, MINN.

THOUSANDS OF PLANTS NOW GETTING THOUSANDS OF SPEEDS



Miracle Motor

ANY RPM BY DIAL CONTROL

Get more production out of your present machines by powering them with U. S. Varidrive motors. No extra space required. Thousands of plants are profiting with this miracle motor. Turning a simple control handle changes speed of the Varidrive to any desired r.p.m. in ratios up to 10:1. Operators can instantly select the speed best suited for the work.

ALL-IN-ONE PACKAGE

Occupies little more space than a single speed motor. ¼ to 50 hp, 2 to 10,000 r.p.m.

U.S. VARIDRIVE

Mail Coupon for 16-pg. Booklet

REQUEST FOR VARIDRIVE BOOKLET

U. S. ELECTRICAL MOTORS Inc. WI-5
Box 2058, Los Angeles 54, Calif. or Milford, Conn.

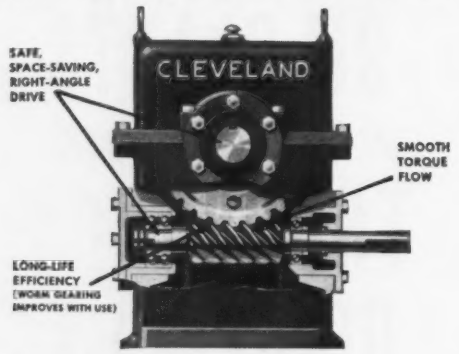
NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE___ STATE_____

HERE'S A WORM GEAR DRIVE THAT IMPROVES WITH USE



EFFICIENCY in a Cleveland is high because bronze gear and nickel steel worm meet exact specifications precisely. Sliding action of worm on gear transmits power smoothly, quietly, with up to 50% increased resistance to shock and wear.

Run in at the factory, a Cleveland drive actually improves with use. Right-angle design saves space.

Learn other Cleveland benefits! Write for Catalog 400. The Cleveland Worm & Gear Company, 3290 East 80th Street, Cleveland 4, Ohio.

THE CLEVELAND WORM & GEAR COMPANY

Speed Reducers

Affiliate: The Farval Corporation, Centralized Systems of Lubrication

for Better Belt Joints
To keep belts in service longer, use only GENUINE Clipper Belt Hooks applied with Clipper Belt Lacers.
use Clipper Belt Hooks
Clipper Hooks are made of the finest quality wire—BETTER than ever before—produced for our exclusive use. Hooks hold with firm, sure grip—give longer satisfactory service.
and Clipper Belt Lacers!
The Clipper No. 9 Portable Lacer laces belts up to 6 inches wide in one quick, easy operation. Under powerful pressure hook legs are embedded flush with the surface of the belt and points clinched, making a perfect joint.
Phone your Industrial Distributor for a demonstration!
CLIPPER BELT LACER COMPANY, GRAND RAPIDS 2, MICHIGAN, U.S.A.
No. 9 Portable Lacer
Clipper
BELT LACING EQUIPMENT
UL

28

"Panl-Frame" buildings

Faster erection, resulting in lower labor costs, is possible with new "Panl-Frame" steel building panels. Panels can be bolted together inside, under all weather conditions, and then taken out for field erection. "Panl-Frame" building is available in width of from 4 to 16 ft., with either 8 or 10 ft. wall heights and lengths in multiples of 2 ft. *For information on other features plus construction principles of this product, circle key number on rip-out postcard.* Butler Manufacturing Co.

29

Low-slung fork truck for close quarters

New Lo-Head electric fork truck is adapted for loading and unloading trailers and box cars, as well as for operations in tunnels, or other areas with low ceilings and overhead obstructions. Truck is modeled after Barrett-Cravens' Palletier, but operator's seat is moved forward, extra high battery of shorter length is used, and over-all length of truck is increased—by less than 6 in. *For information circle key number on rip-out postcard.* Barrett-Cravens Co.

30

Drum Major slushing action cleans oil-caked metals

Where oils are baked onto metal in form of a gum, and removal of soil and dirt requires mechanical action, Drum Major Slush, a solvent spray type of cleaner, performs the work. Slush pump is pneumatic and leakproof. Work load capacity of degreaser is 400 lb. per hour. *For specification sheet circle key number on rip-out postcard.* Currier Co. A-3

31

Iodine without "sting or stain"

In Showersan, a new disinfectant for industrial and institutional use, iodine is rendered non-irritating and non-staining by its combination with a compatible synthetic detergent. *For more information, circle key number on rip-out postcard.* West Disinfecting Co.

32

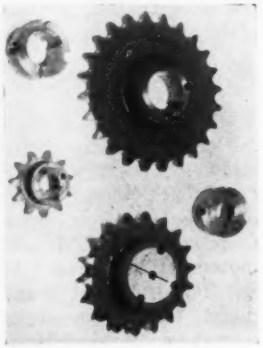
"B" series cylinder . . .

. . . just added to HyPower line is said to combine: lighter weight without sacrifice of quality; and provision for use of simple, dependable non shaft damaging stroke control. Units are streamlined without use of stay bolts or

O ring seal at bottom of cylinder barrel and base casting joint. *For specification sheet and more information, circle key number on rip-out postcard.* Turlock Iron and Machine Works.

33

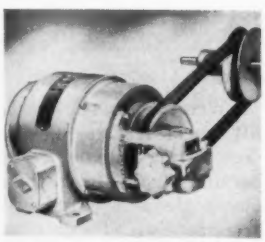
Expanded line of roller chain sprockets



Morse Taper-Lock roller chain sprockets in both single and double hub types are now available in an expanded line of stock sizes for No. 120 (1½-in. pitch), No. 140 (1¾-in. pitch) and No. 160 (2-in pitch) chain. All stock sprockets in new sizes up to 26 teeth are approximately 0.40 carbon steel and can be flame hardened to customer order. *For more information circle key number on rip-out postcard.* Morse Chain Co.

34

Mount both motor and drive as a single unit



New Reuland motor design features special adapter end bell for direct mounting of Reeves Flexi-Speed drives, used on conveyors, labeling and bottling equipment, drill presses, lathes, etc. Easier layout and mounting, as well as space saving, are accomplished, Reuland motors adapted to direct mounting system are available at ½ and ¾ hp. in 1800 and 1200 rpm. input speeds, and at 1 hp. in 1800 rpm. *For further information circle key number on rip-out postcard.* Reuland Electric Co.

35

Conveyor support is portable and adjustable

Speedtrux is an all-welded portable support for gravity conveyors, with adjustable arms that permit raising and lowering conveyor line to any height desired. Easy to set up, units can be stored in a nested position. Speedtrux capacity is 10-ft. section of gravity wheel or roller type conveyor plus maximum load of either. *For complete information cirele key number on rip-out postcard.* Speedways Conveyors, Inc.

36

For extension of electro-mechanical operations

IBM's new coded signal receiver is designed to extend automatic operation of signals, relays, circuit breakers, switches, and other electro-mechanical devices in remote

SERVICE

. . . introduces a superior truck

TO SAVE YOU MONEY

"THE *Handler*"

First proven gasoline powered Lift-Truck with hydraulic drive . . . and hydraulic control*

The simple movement of this one lever automatically shifts from low to high and high to low . . . two speeds forward and two speeds backward.

By simply raising the control lever the Handler's power *lift* goes into action. No time lost hunting other controls. Completely modern.

"Dead man" brakes — *always more safe.* And on the Service Handler they are *automatically applied* the instant the operator lets go the control handle or steps off the truck.

And REMEMBER . . . INSTANTANEOUS REVERSING WITHOUT SHIFTING OR ROTATING THE POWER UNIT.

The *new* Service Handler is the ultimate in rider-type powered lift trucks. Its economical and efficient 6 h.p. gasoline engine has the power and stamina to keep the brawny Handler performing around-the-clock, at startling savings. And it's easy to service. All working parts are accessible in seconds by simply unsnapping the hood.

RIDER-TYPE — means covering the plant in quicker time, reducing the overall cycle time.

**Patent Applied for*

SERVICE CASTER & TRUCK CORP. ALBION, MICH. SOMERVILLE, MASS.

Manufacturers of CASTERS • WHEELS • TRUCKS LIFTERS • LIFT TRUCKS • SPECIAL EQUIPMENT

MAIL *Today*

Service Caster & Truck Corp. ALBION, MICHIGAN

Please quote prices on _____ SERVICE HANDLERS with platforms of _____ size.

( ) Have salesman call.

COMPANY _____

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CITY _____ STATE _____

INDIVIDUAL _____

EXTRA PROTECTION AT THESE TWO SPOTS

CUFFS UP
Here's control of injurious liquids — keep arms and inside of gloves dry.

CUFFS DOWN
Extra margin of safety — a two-inch longer gauntlet for really plunging in.

SURETY

PATENTED
TURN-CUFF
INDUSTRIAL GLOVES

Surety Turn-Cuffs are available in a wide range of natural and synthetic rubber types created for specific jobs for long wearing life. As a positive protection against dermatitis and allergies created by injurious liquids you'll find a Turn-Cuff style to meet your needs as recommended by so many safety directors and insurance companies. But even just for wearing qualities you'll find Turn-Cuffs the superior glove. From your Jobber or write direct.

THE SURETY RUBBER CO.

In Canada, Safety Supply Co., Toronto

WESTERN DIVISION
544 MARKET STREET, SAN FRANCISCO 4, CALIF.

CARROLLTON, OHIO

Make Your Own Hose Lines

Cut Costs
Reduce Inventory
Reduce Downtime

Aeroquip Hose and Fittings form a perfect combination that permits you to make hose assemblies that meet Aeroquip's standard of quality . . . the highest in the industry. No special skill or training is required. This "Aeroquip Idea" cuts costs, inventory and downtime.

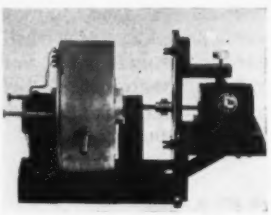
Aeroquip
*REG. TRADE MARK

AERO-COUPLING CORPORATION
(A Subsidiary Of Aeroquip Corporation)
3015 Winona Avenue, Burbank, Calif.
Sales Office and Warehouse for Oregon, Washington and Idaho:
SPARKS-WILLS, INC., 1624 S. E. Grand Ave., Portland 14, Ore.

locations according to pre-selected programs. Devices are controlled by code pulses transmitted over regular AC lighting wires when used with an IBM electronic time and program control system and by electrical impulses when used with wired time systems. *For more complete information, circle key number on rip-out postcard.* International Business Machines Corp.

37

Dynamometers for small motors



Need to measure electric motors of two hp. and less? Dyna-Chek model DM-3 will do it for you. Dyna-Chek model MDM tests motors of less than 1/10 hp. Two types of broad-range speed measuring equipment are available as extra accessories. One provides accuracy to two percent, other one to 1/10 of one percent. Dyna-Chek bulletin gives complete information. *For your copy, circle key number on rip-out postcard.* Mission Western Engineers, Inc. 154

38

"Weld-Bilt" for handling ease

"Weld-Bilt" single stroke, lift trucks feature full 270 deg. lifting handle which permits load lifting from any angle with a full 360 deg. swivel. A safety spring keeps handle in vertical position so that it cannot drop to floor. A front wheel "equalizer" permits movement of axle to compensate for uneven floor surfaces and obstructions. *For specification sheets, circle key number on rip-out postcard.* Keville Industrial Service.

39

Banty model gasoline tractor

Mercury Banty Model 460 is a 3,000-lb. gasoline tractor with a sustained tractive effort of 1,100 lb. at 5.7 mph. Frame is a one-piece weldment fabricated from pressed steel and rolled sections. Steering control of two Timken bearing mounted front wheels is provided by a centrally located Ross cam and twin lever gear fitted with sturdy hand wheel. *For specification sheet circle key number on rip-out postcard.* Mercury Mfg. Co.

40

New 10-key adding machine

Here are some of the advantages of newly introduced adding machine: numbers show in easy-vision keyboard window in advance of printing; live operating, oversize keys; new keyboard arrangement and concave surfaces on keys in center row so that touch operation can be easily acquired. *For detailed information circle key number on rip-out postcard.* Friden Calculating Machine Co., Inc.

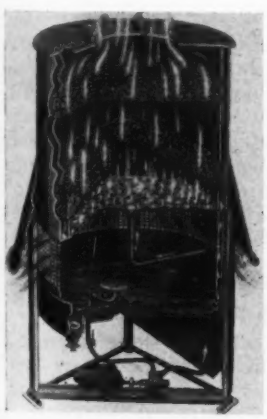
41

Bronze electrode for strong joining

Versatile Bronzochrom electrode, EutecTrode 1850, has been developed for high strength joining and for frictional and corrosion resistance on a wide variety of base metals. It produces copper base deposits alloyed with silicon, manganese and chromium, etc., which increase tensile strength and give additional resistance to wear and corrosion. Manufacturer recommends it for joining and overlaying steel, cast iron and copper alloys. *For explanatory leaflet, circle key number on rip-out postcard.* Eutectic Welding Alloys Corp. TIS 2190

42

For collecting dust



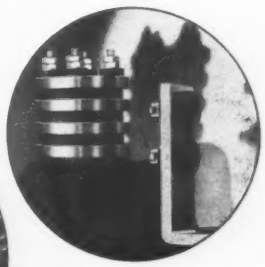
New low-resistance-type Cycoil oil bath air cleaner, designated Type P, introduces principle of perforated entrainment plate for dust removal. Equipment is designed for engines using turbo-chargers or pressure blowers for scavenging. It is claimed that a uniformly high cleaning efficiency can be obtained in an operating range from as low as 10% up to full rated capacity. Same principle can be used with water as an evaporative cooler, and combination of two complete assemblies, to cool air and remove dust, is known as Cycoil-Koolair arrangement. *For bulletin circle key number on rip-out postcard.* American Air Filter Co. 160-A

43

Unit separates high grade magnetic residues

Manufacturers confronted with problem of reclaiming steel containing expensive metals from non-magnetic materials will be interested in this magnetic agitator separator. Because this separator is non-electric, its strength cannot be affected by power lags or surges. There is no need for wiring, fuses or generator equipment, and magnetic strength lasts indefinitely. *Circle key number on rip-out postcard for more information.* Eriez Manufacturing Co.

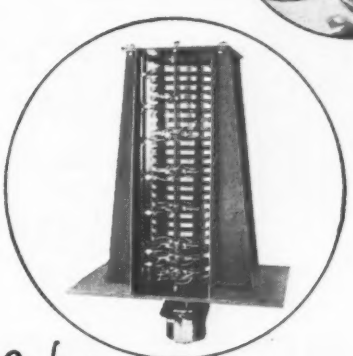
Collector Rings



Wesche Collector Rings are available in many standard designs and sizes. More typically, we are called upon to design and build custom rings for a specific application.

Collector rings serve to complete electric circuits between stationary and revolving parts such as heated rolls, revolving platforms or cranes and rotating machine parts. Wesche Rings are bronze, insulated from each other with phenolic or fibre. Required number of terminals extend from one or both ends. Two to more than 40 rings may be assembled into a unit rating from fractional to more than 200 amperes. Up to 48" diameter.

Silver plating, split rings and many other special optional features to order.



Write for catalog containing data sheet for easy ordering.

THE B. A. WESCHE ELECTRIC CO. (Welco)

VINE & LIBERTY STS., CINCINNATI, OHIO

44

"Well-adjusted" screening equipment

Vibrating screen incorporates new feature so that it will align itself on any slope, either suspended with cables or mounted on frame with an arrangement of springs and supports. Screens are made in various sizes, one, two or three decks, and furnished complete with motor and drive, mesh or punched plates. *For information circle key number on rip-out postcard.* Bodinson Manufacturing Co.

Break Loading Bottlenecks!

With **MagLiner** MAGNESIUM **DOCK BOARDS**

Magnesium Light!

Magnesium Strong!

Magnesium Safe!

Write today for your copy of Magliner Bulletin DB-204

Have you considered the advantages of equipping your docks with Magliner magnesium dock boards? Are you aware of the many benefits awaiting you? *Reduced loading costs! Easier handling! Greater speed and efficiency in shipping-receiving operations!* In the case illustrated above, the manufacturer took positive steps to insure against the penalty of loading bottlenecks . . . he investigated and installed Magliner magnesium dock boards! What about you? It costs nothing to get the facts! It can keep you steps ahead of the competition!

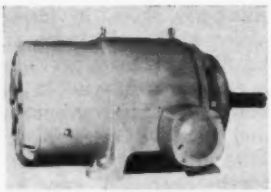
MAGLINE, INC.

P.O. BOX 402 PINCONNING, MICHIGAN

W. T. Billard, Inc., Los Angeles 13, Calif.; C. H. Collier Co., Houston, Texas; Equipment Supply Co., Salt Lake City 1, Utah; Air-Mac, Inc., Seattle 99, Wash.; Air-Mac, Inc., Yakima, Wash.; Air-Mac, Inc., Eugene, Ore.; Hamerslag Equipment Co., San Francisco, Calif.; Hathaway-McCartney Engr. & Supply Co., Denver 10, Colo.; Kistler Industrial Service, Phoenix, Ariz.; Air-Mac, Inc., Spokane 10, Wash.; Air-Mac, Inc., Portland 14, Ore.

45

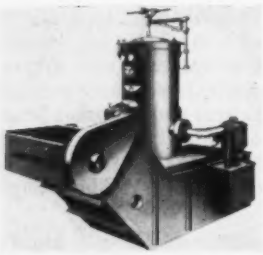
Now—150 hp. totally-enclosed motors



Totally-enclosed motors, Type SD designed for protection against dirt, moisture, oil and chemicals, and explosion-proof motors, Type SE designed for service where inflammable gases, volatile liquids or combustible dusts are present, are now available in ratings up to 150 hp. *For bulletin with information, circle key number on rip-out postcard.* U. S. Electrical Motors, Inc.

46

Three-phase filtering for cutting oils or coolants



Magna-Flomaster is a new combination clarifier and filter for mineral cutting oils or water soluble coolants used with finishing grinders and other machine tools. Available in three models with flow rates ranging from 20 to 40 gal. per min., larger units may be ordered specially. *For complete information or free consultation service, circle key number on rip-out postcard.* U. S. Hoffman Machinery Corp.

47

Patent Scaffolding offers Burton's shores

Burton's all steel shores, sole type with tamper proof locking at desired height, are now available through *The Patent Scaffolding Co.* distribution system. Designed to be easily carried, installed and adjusted by one man, device features a slotted adjusting pin guide and permits addition of 8 or 14-in. U-heads without requiring dismantling. Bulletin M-2 will give you complete information. *For your copy circle key number on rip-out postcard.*

48

Straddle type for stacking pallets

In every plant—in warehouses and stores, there are loads too heavy for manual lifting. Economy battery operated hydraulic Worklifter is designed to lift those loads more easily, more quickly, at moderate cost. And one man does this work safely, without risk of costly accidents. *For specification sheet on Model WL-F, circle key number on rip-out postcard.* Economy Engineering Co.

More NEW EQUIPMENT on page 117

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HELPFUL LITERATURE

53

Blast cleaning accessories described

This 28-page booklet describes accessories and supplies which are available for use with Pangborn blast cleaning equipment. Booklet includes engineering selection data as well as specifications. Several pages are devoted to correct selection of abrasives according to cleaning requirements. *Pangborn Corp.* 300C

54

Info on a soft abrasive wheel

Sheet on Grind-O-Flex, a soft abrasive wheel made in various grits, shows photographs of various uses. Its features are presented and setting-up instructions are included. *Merit Products, Inc.*

55

"Environment-proof switch assemblies . . .

. . . for use in exposed locations in aircraft," are subject of this preliminary data sheet. Information on dimensions, electrical ratings, conduit variations and prices of Micro Switch "EH" series is included. Charts and drawings present details clearly. *Minneapolis-Honeywell Regulator Co.* P79

56

New Propellair industrial fan bulletin . . .

. . . covers Type CS Tubeaxial and Type CSB Stackbooster fans. Twelve pages contain dimensions, applications, and performance data. Helpful information is offered concerning cooling and drying problems, system ventilation, and open surface tank ventilation. *Robbins & Myers, Inc.* 650

57

Condensed folder on metalworking tools

Briefly cataloged in this 17 x 22-in. sheet are all principal Delta tools designed for metal-working industry. Photo-illustrated tool descriptions are displayed on one side so that opened folder may be used as a wall chart. Text on reverse side points out advantages of Delta power tools in many metalworking production applications. *Rockwell Manufacturing Co.*

58

Distribution transformer booklet available

Large distribution transformers (250-500 kva) designed to cope with increased load densities on distribution systems are discussed in this new

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WESTERN INDUSTRY

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brochure. Constructional and standardization characteristics of these transformers (Type SL) are described and related to economic handling and operation procedures. *Westinghouse Electric Corp.* B-6134

59

Bulletin on flash-type steam generators

A new arrival is 4-page catalog-in-brief, describing and picturing complete line of Malsbary flash-type steam generators and industrial hot water heaters. It shows models from 1½ to 30 boiler hp., lists uses, summarizes advantages of flash-type coil construction and contains easy-to-read specifications covering capacity, fuel and water requirements, dimensions, shipping weights, etc. *Storm, Inc.*

60

Job study on lift trucks

Even though your business may have nothing to do with heavy chemicals, you'll find a barrel of profitable information in this study made at Carteret, N. J., plant of Westvaco Chemical division, Food Machinery and Chemical Corp. Prepared by *Towmotor Corp.*, certified survey shows just how modern mass handling is saving $50,000 yearly for this manufacturer. 130

61

New fittings catalog and piping handbook

Three hundred four pages include a technical data section featuring new, easy to use, allowable stress and P/S values, maximum allowable working pressure charts and other tables that are up to date in latest provisions of applicable codes and standards to assist in solving piping problems. *Ladish Co.*

62

Leaflet on precision non-inductive resistors . . .

. . . describes K-F series of nine types providing standard values over range of 0.1 ohm to 1 megohm in values exact to 1, 0.5, or 0.1% accuracies. Series is illustrated, identified by type number, and tabulated in a compilation of data which includes wattage, diameter, length, and net prices. *K-F Development Co.* PR-154

63

A line of burnishing or pivot polishing machines

These eight pages show how machines combine work-hardening, minute shaving and polishing into one single operation. Illustrated are typical jobs with total machining times given in seconds. *Carl Hirschmann Co., Inc.*

HELPFUL LITERATURE

for the plant operator who wants to keep informed

64

How to get most from Worksaver

With a cartoon technique illustrating points, this 16-page booklet serves as a guide for efficient operation and trouble-free maintenance of Yale Worksaver electric trucks. It should be of value to anyone who owns or operates a motorized hand truck. *The Yale & Towne Manufacturing Co.* P-1033

65

24 pages of fork lift trucks

In addition to detailed specifications on Gerlinger models of long and short wheelbase fork lift trucks, this comprehensive guide devotes two pages to attachments. Another section points out how storage and profits can be increased without adding to present plant size. Information is included on seven material carriers. *Gerlinger Carrier Co.*

66

Safe teen-age driving promoted

A new 32-page cartoon book, "Tommy Gets the Keys" is now available to help educate teen-age drivers in safe and sane operation of automobiles. Story concerns a boy who is old enough to get his driver's license but whose father wants his son to have proper instruction before he begins driving alone. *B. F. Goodrich Co.*

67

Protection against decay, termites and fire

Folder on Baxco pressure-treated forest products points out that no wood preservative can give lasting, effective protection unless the treating process is equally effective. Important uses for pressure treated wood are illustrated. Preservatives used are listed and explained. *J. H. Baxter & Co.* 5e-BA

68

About cams, camshafts and crankshafts

This guide to quality castings includes a chart on general engineering types of meehanite metal and drawings which show comparative structures of cast iron, steel, and meehanite. Product photographs are accompanied by descriptive material. *Compton Foundry.* 39

69

Collection of Drum Major information

Several sheets include one with pictures of units in Drum Major degreaser line, and a chart of their specifications. Another sheet gives price listings and descriptions. And still another presents features of this equipment. *Currier Co.* A-2, A-5

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70

Brochure tells of safety and versatility

This publication describes mobile HECO Safety Work Platform which, when used in conjunction with a fork lift truck, is said to provide immediate and easy work access at any elevation. Detailed illustrations are included. *Hamerslag Equipment Co.*

71

"Allegheny Metal in Chemical Processing"

This revised 34-page book covers use of stainless steel in manufacture of acids and other chemicals, in general process industries, in plastics industry, in pharmaceutical manufacture, in dye making and in soap making. Corrosion resistance data, fabricating information, and a stainless steel finder are all included. *Allegheny Ludlum Steel Corp.*

72

Details of 10,000 lb. capacity fork truck

Model F-39T10 electric powered, 10,000 lb. capacity fork truck is subject of this illustrated folder. Complete design specifications, operating and construction features and applications are listed. A full page is devoted to a detailed analysis of major components. *Elwell-Parker Electric Co.*

73

Guide to electric actuators

This 64-page booklet outlines applications and specifications of 20 basic types of linear and rotary actuators, power units, jacks, gear boxes and ammunition boosters. It is designed to help potential users choose models that will best suit their needs. *AiResearch Manufacturing Co.*

74

Bulletin on G-E station-type arresters

New 28-page, two-color brochure describes operation and design of a new Thyrite magne-valve arrester that combines magnetic action and valve action. Application information and a guide for selection of arrester ratings are provided. *General Electric Co.* GEA-1304L

75

Describes portable temperature indicators for heavy-duty use

Here is a new eight-pager on two portable temperature indicators—Potentiometer Indicator and Resistance Thermometer. Described in detail are operating adjustments, features of design, test circuits, measuring ele-

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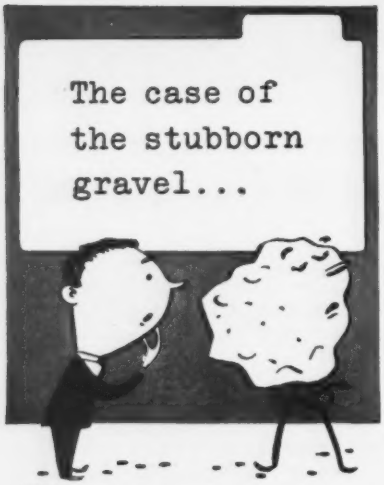
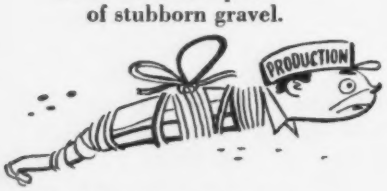
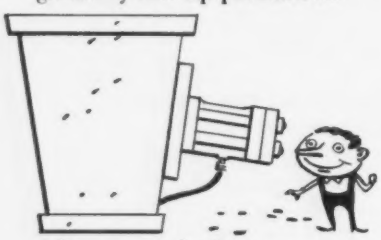


Yes, believe it or not, chaos really reigned in this case of a Washington gravel plant . . . all because of a pile of stubborn gravel.



It bridged . . . it arched . . . it plugged . . . and generally tied up production.



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HELPFUL LITERATURE

ments and instrument specifications. Tables list type of thermocouple or resistance bulb recommended for each range. *The Foxboro Co.* A-303

76

To control temperatures of industrial liquids

Operation of Niagara aero heat exchangers is shown by diagrams in this 4-page bulletin, and installation photographs picture examples of their use in cooling or controlling temperatures of liquids in process industries, metal working, and manufacture of electrical equipment. *Niagara Blower Co.* 120

77

Find out about frequency-selective voltmeters

Technical bulletin issued by *Sierra Electronic Corp.* describes circuitry, range, application and operating techniques for four Sierra frequency-selective voltmeters. It also contains information on other carrier-frequency measuring equipment manufactured by company. 107

78

Latest issue of "Power Points Digest"

Vol. 10, No. 2 of this pocket-sized company publication pictures and describes six applications of Onan electric generating plants. Onan-powered reflectoscope, an instrument for detecting flaws in railroad rails and switches, is also described. *D. W. Onan & Sons Inc.*

79

Lower cost daylighting for buildings

Folder shows Corrulux translucent panels used as skylights, sidelights, partitions, and awnings, in full-color photographs, with more suggested uses in text. Three types of panels, with varying light transmission qualities, are described, as well as methods of installing material. *Libbey-Owens-Ford Glass Co.*

80

Pumps for every pumping problem

Twelve-page booklet explains every type of Aurora pump: single suction, double suction, turbine-type, multi-stage, semi-open, non-clog, mixed flow, and jet. Information includes photographs, diagrams and condensed selection information, with references to more detailed company bulletins. *Aurora Pump Co.*

81

What is molded fiberglas?

The answer is in this small folder, which also lists advantages of molded fiberglas and applies it to a variety of manufacturing problems. *Kimball Manufacturing Corp.*

82

Bulletin on vibration control

On-the-job photos and case histories are given in this bulletin showing how typical diesel and gas engine vibration problems have been solved. Installations shown range in size from a 16 hp. diesel generator set on a truck up to a series of six 1,425 hp. supercharged diesels at a power plant. Material used in every case is steel spring isolators, correctly engineered for the job. *The Korfund Co., Inc.* PS-4

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83

Self-coupler is safer, quicker

New bulletin on Mercury safety self-coupler for trailer trains diagrams coupling mechanism and shows in 4 pages how it offers safety of operation, good trailing qualities, speed in adding or dropping trailers. Safety self-coupler can be applied to any caster-type trailer. *Mercury Manufacturing Co.* M-130

84

Trucks for tow-line systems

Illustrated in this 8-page bulletin are 13 different models of Nutting floor trucks, in wide range of sizes, with 5 different types of tow mechanisms for use with either overhead or under-floor powered conveyors. Other photographs show recent installations of tow-line systems. *Nutting Truck and Caster Co.* 54-TL

85

For cooking or cooling

Folder describes Rietz Thermascrew, basically a true heat exchanger consisting of a hollow screw mounted on a hollow shaft, rotating at slow speeds in a jacketed trough or pipe. It is able to handle many types of materials that cannot be treated in conventional continuous heat exchangers, and can be applied to processing of chemicals, fats, fruits and vegetables, glutinous and granular materials, pastes and powders. *Rietz Manufacturing Co.* T-506

86

Rotex cylinders for air-water service and low pressure hydraulic

Two-color folder has data on Rotex cylinders: mounting data, cylinder capacity for various pressures, pressure limitations and other vital statistics. Complete with line drawings and plenty of charts. *Rotex Punch Co., Inc.*

87

Pumps for high pressure service

Tuthill pump guide for Model CK series is an 8-page booklet giving table of dimensions and table of parts for each CK model. By checking service, performance characteristics and distinguishing features given in this guide, model best suited to a particular need can be chosen. *Tuthill Pump Co.* 103

88

Industrial lawn mower for dense mowing

Single sheet contains photographs and specifications of Model 72 power-take-off rotary unit, designed for industrial mowing, which can be used with leaf-mulching attachment to keep grass areas free of leaves. *Worthington Mower Co.*

89

Pillow blocks for heavy duty

The reasons for choosing Jones-Timken equipped pillow blocks where operating conditions are severe—shock loads, dust, dirt, abrasives and moisture—are subject of this 22-page bulletin. Diagrams and specifications supplement text. *W. A. Jones Foundry & Machine Co.*

90

Paper on manufacturing steel pipe in West

"Manufacture of Pipe as Related to End Use" is title of this 18-page paper by Richard Aubrey, metallurgical engineer on tubular products with Kaiser Steel Corp. It covers weld processes in use on West Coast for steel pipe manufacture: continuous furnace welding, electric resistance welding, and submerged arc welding, with illustrations of each process.

91

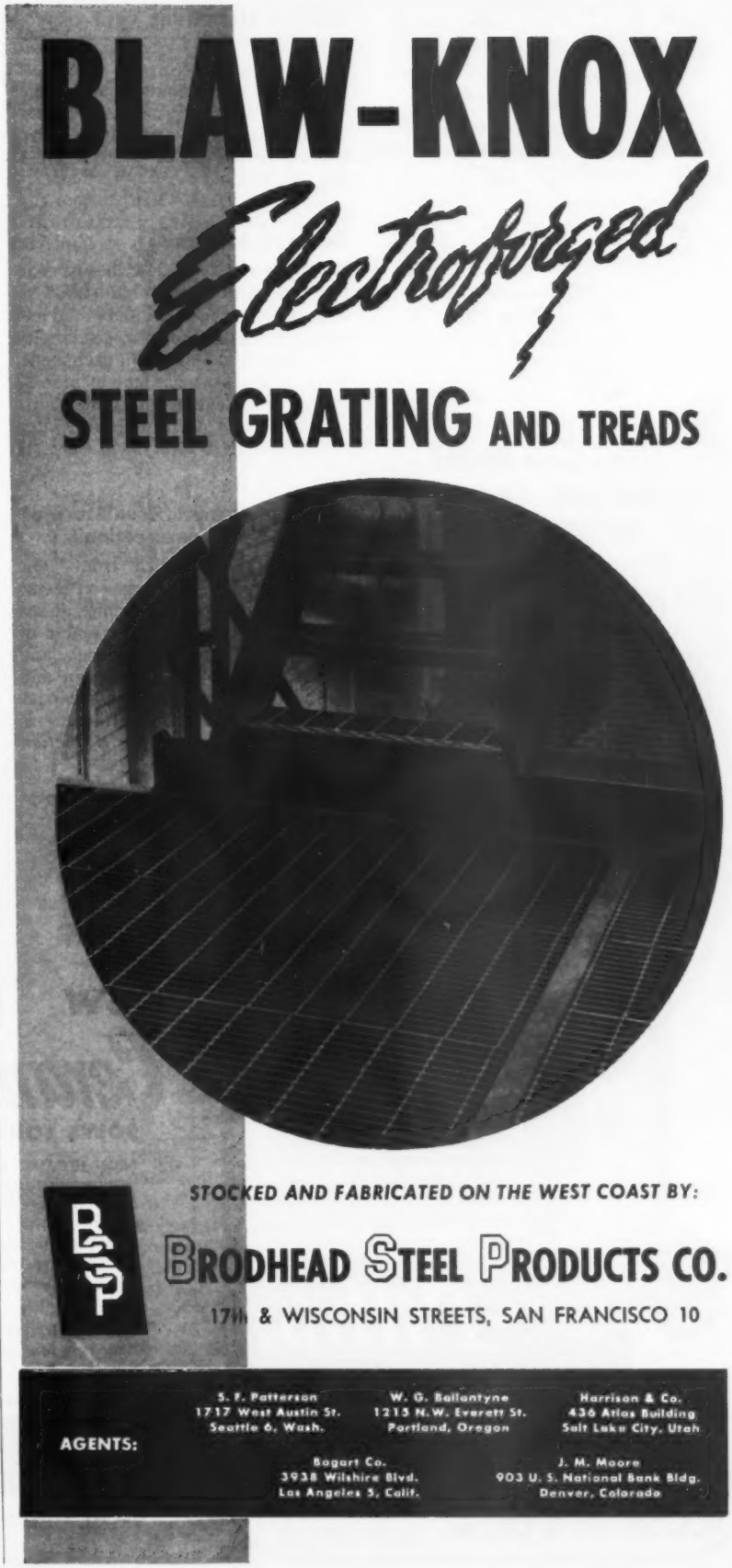
Picturing vinyl tile floors

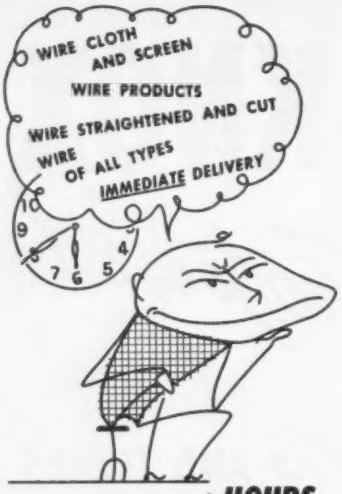
Full-color four-page folder shows typical home and commercial installations of KenFlex vinyl tile—the floor that says "come again" to business prospects. *Kentile, Inc.* 310

92

Brochure on high-heat resisting finishes

New four-page, two-color bulletin gives physical properties, various ap-





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HELPFUL LITERATURE

plications, and economic advantages of special finishes for hot metal surfaces, along with application directions. *General Paint Corp.* 5311; A.I.A. file No. 25-C-3

93

Guide to Aro tools

Aro's new catalog describes its complete line of air tools for industry. This attractive 76-pager, printed in red and black, is designed for easy readability with important features of each model listed in short concise statements . . . general specifications in simple charts . . . and tools illustrated with large clear photos. *Aro Equipment Corp.* 61

94

"Collision Reveals True Story of Welded Ship Construction"

This reprinted article from "The Welding Engineer" enlarges on theme that an encounter of two ships at sea can tell a good deal about strength of materials, effectiveness of tools and techniques used in construction and quality of skill and craftsmanship. A condensed list of Airco products is printed on final page. *Air Reduction Pacific Co.* ADR 86

95

Collecting cast iron dust

A type of dust considered difficult to control, handled by a standard Dustkop dust collector is subject of this bulletin. Problem is briefly analyzed, steps taken in selecting and installing equipment are related, and cost of installation is given. *Aget-Detroit Co.* 640 No. 1

96

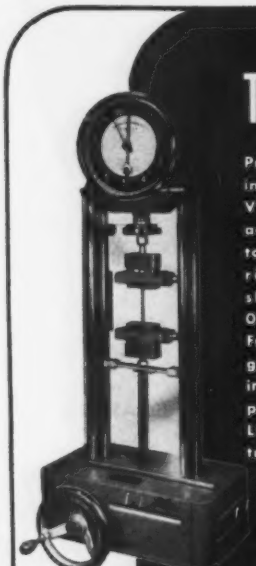
Bulletin out on industrial cranes

On top of product photographs and descriptive text for each, here is good information on how to select a crane with general specifications. Further along there are plans and charts on crane clearances. Installation photos are also included. *Ederer Engineering Co.* CR-610

97

"Automatic Transfer Switches"...

. . . is a bulletin telling of factors to look for in selecting an Automatic Transfer Switch. Important subjects are taken up such as: continuous duty rating, single throw vs. double throw, quiet operation, and full relay protection. Should prove helpful to those selecting switches and for installing, hooking up and maintaining emer-



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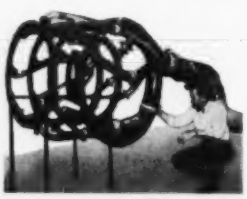

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gency lighting and power sources. *Automatic Switch Co.* 502

98

"The Materials Handling Cost Cutter"...

... is a guide intended to help the general businessman analyze his own materials handling problems. Clear, concise explanations of "whys" and "hows" of effectively applying mechanized materials handling procedures to manufacturing, processing, and warehousing operations are given. A complete sample flow chart graphically presents all elements in materials flow and handling. *Automatic Transportation Co.*

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99

Truck replacement parts

A new catalog of replacement parts for Clark, Towmotor and Ross fork lift trucks is just out. All parts are illustrated and a complete price list is included showing list and net discount prices. *The Boman Co.* 54

100

"Custom Designed" first aid guide

A new first aid catalog contains complete information and photographs of 16 different types and styles of Bullard "Safety Green" first aid kits including new fire department and pocket kits. A page of 70 different packs is included so that any combination desired can be picked with ease. A data sheet of suggested units will be helpful. *E. D. Bullard Co.*

101

Hydratork drive illustrated

Design, operation and maintenance of recently introduced, clutchless Hydratork drive is covered in this new eight-page illustrated brochure. Photographs include drive assembly and disassembly and close-ups of cutaway working production units. Operational advantages are discussed. *Clark Equipment Co.* SP-4008

102

Read about new method of water softening

In a just-released publication, operation, design, dimensions, and capacities of new Zeo-Flo Sodium Zeolite Softener are fully described. This literature should be of particular interest to those interested in small and medium size industrial plants, laundries, hospitals, apartment houses, etc. *Cochrane Corp.* 4505-A

103

Alloy reference chart lists analyses, properties, uses

A reprint from "Materials & Methods," this chart lists chemical analyses, physical properties and recommended applications for 28 different grades of cast stainless steel. Bulletin indicates ACI, AISI, SAE, ASTN and general "type" designations. Heat treatment data and remarks concerning weldability and machinability are included. *Cooper Alloy Foundry Co.*

104

Equipment suited to every filtration need

Eight-page folder shows basic types of industrial filters used in reclaiming coolants, oils and solvents. For each piece of equipment there is a write-up telling how it works and the jobs it is used for. Hoffman engineers offer a free survey of filtration problems and laboratory analysis of oils and solu-

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Challengers available in ½-, 1- and 2-ton capacities — other Coffing spur-gear hoists in capacities from ½ to 25 tons.

Here are just a few of the "extras" that keep the new Coffing Challenger spur-gear hoists on the job, save maintenance:

- Housing is formed steel plate — withstands shock loads and rough handling.
- Laminated steel back plate gives extra support to hoist mechanism.
- Tested at 100 percent over warranted, rated capacity.
- Gears and bearings have life-time lubrication.
- The Challenger has only 29 basic parts — simplest spur-gear hoist ever made.
- May be completely disassembled in minutes with ordinary tools.

Test these points yourself. Pick out the toughest hoist job you have, install a Coffing Challenger spur-gear hoist — then see how little maintenance is required, how it *stays on the job.*

For further information on Challengers, write Dept. WI-5.

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HELPFUL LITERATURE

tions, where desirable, in order to recommend specific equipment installations. *U. S. Hoffman Machinery Corp.* A-943

105

A guide to better floor finishing

Multi-Clean Florule (floor-rule) is a 4 x 6-in. cardboard chart with spin selector which tells at a glance proper materials for finishing various types of floors, as well as coverage in sq. ft. per gal., drying time and method of application. *Multi-Clean Products, Inc.* 310

106

To help in ladder or scaffold selection

Choosing correct equipment for any job is made easy for you in this revised eight-page guide, by breaking down maintenance work into four classifications: painting and cleaning, electrical work and equipment maintenance, plant repair and maintenance, and special jobs. On-the-job photographs are included. *The Patent Scaffording Co., Inc.* G-205R

107

Arc welding guide

New illustrated 20-page catalog lists Metal & Thermit arc welding accessories, including electrode holders, helmets, eye shades, ground clamps, cleaning tools, gloves, welding cable and other products. *Metal & Thermit Corp.*

108

"Taylor Forge" magazine

Second issue of this company publication, written for engineers and designers, contains a review of American Standards Assn. code on pressure-temperature ratings for steel pipe flanges and flanged fittings; also a report by ASA task force on flexibility in pressure piping. This issue is dated November 1953; No. 1, June 1953, is also available. *Taylor Forge & Pipe Works.*

109

Small presses do a big job

Literature on Kenco four-in-one 4- and 5-ton punch presses lists their safety and time-saving features which are usually found only in large presses. Another single-page bulletin describes new precision-built 1½-ton bench model punch press introduced by company. *Kenco Manufacturing Co.*

110

Where to use a Conoflow cylinder

Eleven drawings showing possible applications of Motodrive equipped with Conoflow control are bound together in this booklet with a parts list for Conoflow control and dimension diagram for Motodrive with control. A few uses pictured are liquid level control (ball float, pressure tank, air purge system and others), solid-liquid ratio control, and dry feeder control. *Reeves Pulley Co.*

111

A pumping manual that's an encyclopedia of basic facts

A 24-page pamphlet, with complete index, giving engineering data and hydraulic tables on water—from the definition of one horsepower to recommended materials for pumping different kinds of liquids—is published by *Pacific Pumping Co.* 2910A

112

For calculating horsepower

This six-page interim bulletin gives necessary information on a new method of calculating horsepower capacity of a Texrope V-belt drive. By using

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formula, you can determine ratings for both standard construction and high capacity V-belts. *Allis-Chalmers Manufacturing Co.* 20B6956B

113

Valves for instrument piping

Four-page data unit, for insertion in loose-leaf notebook, gives specifications and application information on Jerguson valves for instrument piping and general use. Diagrams illustrate how these valves do work of a multiple set-up of valves and connections formerly used for instrument and regulator piping. *Jerguson Gage & Valve Co.* 234

114

Link-Belt silent chain drives

This is an 88-page booklet, with photographs and drawings, on application of silent chains, said to combine flexibility and quietness of a belt with reliability of gears. Contents include procedure for selecting completely engineered drives, a table of service factors, rating tables and chain length and center distance computations; a listing of available chain widths and other dimensions; accessories; installation, maintenance and lubrication methods. *Link-Belt Co.* 2425

115

Bearings

Here are specifications for Halfco two-piece integral hi-load self-aligning bearings in six one-page tables, bound in loose-leaf form. Material, finish and heat treating qualities are covered, as well as dimensions of Halfco's grooved bearing series, heavy duty series, neck ball series, and special bearing series. *U. S. Bearing Corp.*

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116

Dust control in paint production

How to control dust in paint manufacture is discussed in a new bulletin giving case histories of four different companies. It shows how dust conditions due to mixing, blending, crushing, and grinding are prevented as a result of using local exhaust ventilation in which Dustube cloth-tube-type dust collectors are employed. *American Wheelabrator & Equipment Corp.* 422

117

Building forced-air gas furnaces

Loose-leaf pamphlet begins with short chronicle of *Henderson Furnace and Mfg. Co.* and then pictures and describes furnaces they build. Last half is a photographic plant tour, showing shops, special equipment and assembly line that produce these furnaces.

118

"Day 'AC' Dust Filters"...

. . . is a 16-page bulletin including AC performance curves from Day laboratory which show filter cloth resistance in inches of water at various air-to-cloth ratios and constant dust loading. Two pages present layout of five No. 84 AC 14 housed filters for about 100,000 cfm. Detailed charts give capacity ratings for company's single AC filters, and present filter dimensions, unhoused, and housed. *The Day Co.* 528-R.

119

Info on herringbone speed reducers

Here is a whole volume-full of information covering reducer types and styles—bed plates, reducer design—production, selection information and quick selection tables. Ratings and di-

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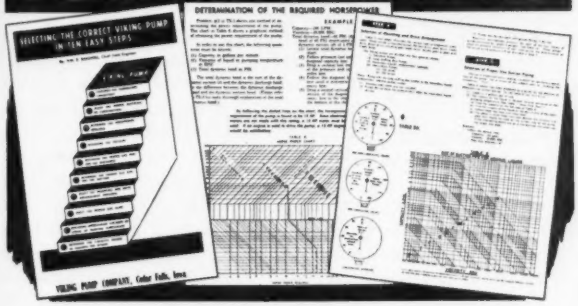

"Selecting the Correct Viking Pump in Ten Easy Steps," is a ten-page booklet designed to help engineers in choosing the right Viking Pump for each application. This folder is free upon request.

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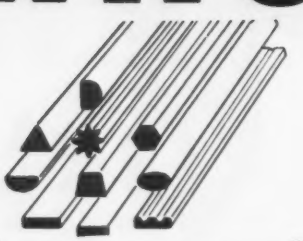

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HELPFUL LITERATURE

mensions—Types SHA, DHA, and THA—are given thorough treatment in detailed diagrammatic and chart form. An inquiry and order form is included, and installation views presented. *W. A. Jones Foundry and Machine Co.* 100

120
Pre-engineered conveyors

Two general types of conveyors: power type, including overhead and belt; and gravity type, including roller and wheel, are presented in this booklet. Equipment and operational photographs illustrate with explanatory text supplemented by diagrams. *Mechanical Handling Systems, Inc.* PE-G-1

PUBLICATIONS FOR SALE

The Employment Interview in Industry, Newell C. Kephart. McGraw-Hill Book Co., Inc., 1952. $4.50. Personnel selection is, abstractly stated, the task of "matching two variables": (1) individual differences in ability to perform and (2) skill requirements of particular jobs. This book focuses on the interviewer's role in the process, against a background of information and interpretation on how to evaluate experience, test abilities, judge personality, and other factors in hiring and placing employees.

Standard Costs for Manufacturing, Stanley B. Henrici. McGraw-Hill Book Co., Inc., 2d ed. 1953. $5.50. This is a revised edition of a book originally published in 1947 for persons desiring an introduction to the practical uses of standard costs as employed in scientific management of manufacturing enterprises. The text has been expanded and partially rewritten for clarity, and additional problems have been added at chapter endings to illustrate topics discussed. Methods of installing and operating a standard cost system are covered in considerable detail, with emphasis upon practical application, including accounting procedure.

Manual on Industrial Water, ASTM Special Technical Publication No. 148, prepared by ASTM Committee D-19 on Industrial Water, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $4.25. This 344-page book provides, first, basic information useful to executives and plant designers in industrial operations that use water as a raw material or in manufacturing processes. It is also of value to water analysts, operators of special instruments, engineers and consultants, because of its references to technical literature and its appendix giving definitions, sampling methods, analytical methods, etc., that have been standardized by the Society.

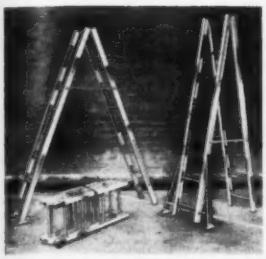
Chemical Processing of Wood, by Alfred J. Stamm and Elwin E. Harris, published by Chemical Publishing Co., Inc. $12. This 595-page book assembles the available information on chemical processing of wood by both conventional and new methods to produce modified wood products, pulp products and various derived chemical products—such as impreg and staypak, wood-base plastics, paper laminates, particle board, and vanillin. Fundamental chemical and physical properties of wood are covered in the opening chapters. Both the favorable and unfavorable characteristics of each wood-treating process are brought out. The book is written primarily for chemists and engineers but will also interest businessmen who want information on utilization of wood waste and inferior species of wood.

Aluminum Heat Treating, Reynolds Metals Co., Louisville 1, Ky. $1; no charge to engineers, metallurgists, instructors and technical men requesting it on company letterhead. First part of this 123-page book explains metallurgy and heat treating of aluminum and its alloys in simplified, non-technical manner. Second part is written for the trained engineer and metallurgist and is a detailed examination of aluminum alloys. Special chapters cover annealing, stabilizing, solution heat treatment, aging, and other subjects. Last section of the book presents tables on complete technical processing data, with recommended times and temperatures. This is a 1954 revised edition of a manual originally published in 1946.

Outline of Executive Development, Bulletin No. 23, Industrial Relations Section, California Institute of Technology. $2, available from Bookstore, C.I.T., Pasadena. This outline is based partly on published material but the greater portion was drawn from discussions held at the 1951 and 1952 Summer Conferences on Executive Development sponsored by the Industrial Relations Section of Cal Tech. Written in outline form, its 46 pages survey the problem of executive training for higher levels of management.

49

Many uses for new industrial ladder



Porta-Fold is a new ladder made of heavy gauge aluminum channel and hardwood with a special design permitting it to be used as an "A" frame or step ladder, as a straight ladder or as a scaffold. It weighs approximately 40 lb. and folds into a compact unit which will fit into an average car trunk. *For brochure giving complete information circle key number on rip-out postcard.* Porta-Fold Co.

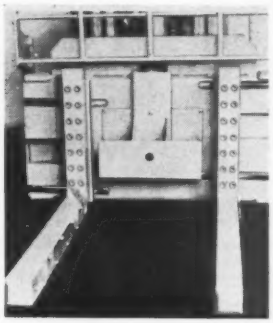
50

Electric truck for restricted spaces

Here is an electric fork truck which operates easily in a seven-ft. aisle and can pick up and deposit loads without straddling pallets or skids. Warehouser Extend-A-Load has a 2000 lb. capacity at 24-in. load center and can pick up a load at any height from floor level to 126 in. An automatic backward tilt of 2¼ deg. insures stability of load in transport. *For additional information, circle key number on rip-out postcard.* The Yale & Towne Manufacturing Co.

51

Clamp arms for industrial trucks



New truck attachment, a standard hydraulic clamp to which has been added a pair of studded forks, makes possible new handling functions for industrial trucks. Clamp arms will pick up wooden cases and similar loads without pallets and can be used for dumping loads or placing boxes on end in order to grip them in another position. Openings range from 18 in. to 66 in. maximum; pressure can be manually adjusted to suit load. *For more information circle key number on rip-out postcard.* The Elwell-Parker Electric Co.

52

Flexco scraper plates

New Flexco belt fastener joins conveyor belts wherever scrapers and plows are used on belts carrying clay, gumbo, tacky materials, fertilizers, and wet fines. Top plates are beveled at both ends so that scrapers can ride over them. Bulletin gives full information. *For your copy, circle key number on rip-out postcard.* Flexible Steel Lacing Co. F-108

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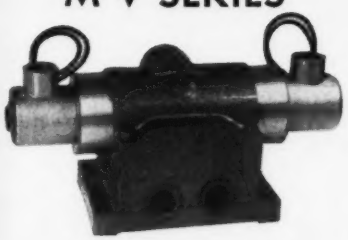

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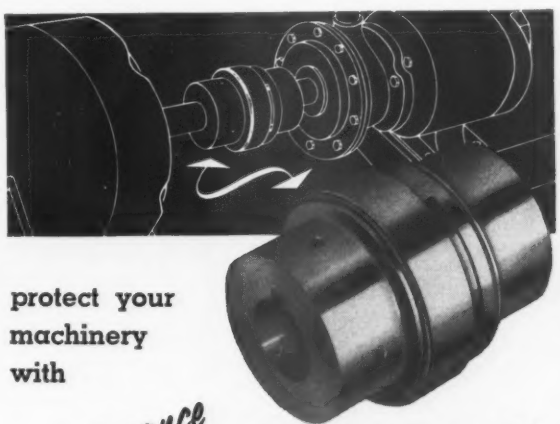

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WESTERNERS AT WORK

ALASKA

Ketchikan Pulp Co.

V. Haner of Bellingham, Wash., is new manager of company operations at Ketchikan.

ARIZONA

Wright Manufacturing Co.

Edmund R. Bezdek is appointed secretary-treasurer of this Phoenix company and of Wright Sales Co. *E. B. Randall* is named representative for latter concern.

International Metal Products Co.

Robert S. Ash, formerly Pacific Coast buyer of heating and air conditioning equipment, Montgomery Ward and Co., is named assistant to president of International Metal, Phoenix.

Arizona Sash, Door and Glass Co.

Carl A. Wilfert joins company as manager of Phoenix operations. He was formerly manager and vice president of Fiberglas Engineering and Supply Co.

CALIFORNIA

Arcadia Metal Products

Charles B. Le Bon is elected vice president of this Arcadia concern. He will continue to supervise engineering and manufacturing.

Clary Multiplier Corp.

Kenneth F. Oldenburg, formerly supervisor in charge of development of new electro-mechanical equipment, is appointed supervisor of firm's electronic laboratory, San Gabriel. His specialized projects in office equipment division will be taken over by *Milton Scozzafava.*

California Steel Products Co.

Harold W. Dornsife is named vice president and general manager of this Richmond concern which was recently acquired by American District Steam Co., Inc., N. Y.

Mission Appliance Corp.

Frank R. Osborne, formerly general manager of plant at Whittier, is appointed general manager of all company operations.

Rosefield Packing Co.

Jerome M. Rosefield is named president of this Alameda concern. *J. L. Rosefield* moves to office of chairmanship of board. *Vivian Alvis* is elected secretary.

Rounds & Kilpatrick Lumber Co.

A. B. Coleman assumes managership of this company at Cloverdale. He was formerly general manager of Little Valley Lumber Co. in Shasta County.

Telecomputing Corp.

T. C. Taylor is named works manager for firm, Los Angeles. He was formerly chief administrator at company's unit, Holloman Air Force Base, Alamogordo, N. M.

Consolidated Vultee Aircraft Corp.

Joseph H. Famme, chief project engineer, and *Charles F. McCabe,* chief electronics engineer, are both appointed assistant chief engineers in Convair's San Diego division. They replace *N. W. Bouley,* deceased, and *Joseph F. Schirtzinger,* resigned to become president and general manager of Consolidated Tool & Products Co., Los Angeles. Mr. Schirtzinger succeeds *Anthony Oberholtz,* deceased. Replacing Mr. Famme is *R. R. Hoover,* former project engineer, and replacing Mr. McCabe is *W. S. Ivans, Jr.,* former chief electronics design engineer. Succeeding *P. G. Osborn* as factory manager, plant No. 1, is *E. O. Johnson,* former assistant factory manager. Mr. Osborn takes over as factory manager of plant No. 2. He replaces *John Doig,* now night manager there.

Gladding, McBean & Co.

Harold L. Kolberg is named general administrative assistant to vice president and general manager of company's Northern California area. He was previously sales manager, Refractories Division, Southern California area. He will headquarter in San Francisco. Gladding McBean elects three vice presidents *Albert R. Said* to be in charge of sales; *Raymond C. Conover,* manufacturing; and *Henry K. Swenerton,* industrial relations.

New Idria Mining & Chemical Co.

Charles F. Parker, Jr., becomes president of firm which headquarters in San Francisco.

Bethlehem Pacific Coast Steel Corp.

Walton W. Hofmann is named chief engineer of construction for corporation's steel division. He will headquarter in San Francisco. Mr. Hofmann comes from Johnstown, Pa.

Stanford Research Institute

Marmion S. Oldacre, former director of research for Commonwealth Edison Co. of Chicago, joins senior scientific staff of SRI, near Palo Alto.

Magna Engineering Corp.

Charles E. Reed is appointed manager of material and method engineering, a new division, at Menlo Park. He has been with company's procurement department.

Apex Steel Corp.

Robert S. Grover is elected executive vice president of this Los Angeles concern.

Selwyn-Pacific Co.

Robert G. Smith leaves Norris-Thermador Corp. and joins Selwyn-Pacific Co., Los Angeles, as president of that concern.

R. G. Smith
Selwyn-Pacific Co.

C. W. Brown
Narmco Resins & Coatings Co.

Narmco Resins & Coatings Co.

Clifford W. Brown is appointed vice president of this firm at Costa Mesa. He was formerly factory manager at Narmco.

R. E. Jones *A. T. Cape*
Powder Melting Corp.

Powder Melting Corp.

Officers of this newly organized N. Hollywood concern, are as follows: president, *Robert E. Jones;* vice president, *A. T. Cape;* and treasurer, *Francis A. Gudger*. They are all associated with Superweld Corp.

Kaiser Aluminum & Chemical Corp.

Separate purchasing and traffic departments are now established at Oakland. *Angus V. McLeod,* in charge of both before their separation, is newly appointed manager of traffic. *Duncan S. Gregg* is named manager of purchasing. He was formerly general manager of machining division of Willys Motors, Inc., Richmond.

H. I. Thompson Fiber Glass Co.

Brandt Goldsworthy is elected vice president of company at Los Angeles. He will also head Industrial Plastics Co., Thompson Fiber's new plastics division.

Waldrip Engineering Co.

Dr. Joseph Remenyi joins this Hollydale concern as chief design engineer. He was at one time associated with Skoda works in Czechoslovakia and later with Raupach Co., Ltd., Germany. *Freeman Gates,* formerly assistant production manager for Consolidated Rock Products Co. of Los Angeles, will manage Waldrip's Aggregate and Mining Machinery division.

Shell Oil Co.

P. E. Lakin, vice president and director, retires and will enter business in San Francisco. Upon his retirement, *S. F. Bowlby,* vice president in charge of exploration and production for Pacific Coast area, became senior Shell officer on West Coast. *Rex C. Hensel* takes over as Pacific Coast area purchasing and stores manager. He replaces *A. E. Collins,* retired. *G. A. Lorenz* is appointed assistant administrative superintendent of Shell's Wilmington refinery. *L. J. Snyder* is transferred from concern's refinery at Houston, Tex., as assistant operations superintendent.

Fresh Frozen Foods Corp.

Allan J. Smith, former production manager of this Watsonville concern, is named general manager to succeed *N. C. Coprivisa,* who is on leave of absence. *Laurie Matiasevich,* formerly with company, is named by Lodi Frosted Foods Co., Lodi, as manager of its plant and controller.

Westinghouse Electric Corp.

C. H. Bartlett, Transformer division executive and former transformer salesman in company's Emeryville plant, is named manager of Manufacturing & Repair division.

C. H. Bartlett *J. H. Pettker*
Westinghouse Electric Corp. *Latchford-Marble Glass Co.*

Latchford-Marble Glass Co.

J. H. Pettker is elected a vice president of this Los Angeles concern. He was formerly plant manager there.

Marquardt Aircraft Co.

Joseph B. Tuzen joins this Van Nuys company's application engineering staff. He was formerly chief of Ramjet-Pulsejet section, Powerplant laboratory, Wright Air Development Center. *Harold A. Fisher,* of firm's Industrial Relations department, is named acting manager of it. *William H. Schwebel,* company's secretary-treasurer, is elected vice president in charge of finance. *D. L. Walter,* director of engineering, becomes vice president in charge of operations.

COLORADO

Climax Molybdenum Co.

C. J. Abrams is appointed head of a newly created exploration division with major operations in Colorado area. He will remain in Denver while taking over new post. He is replaced as manager of Western operations by *Frank Coolbaugh,* formerly resident manager at Climax.

AEC

Charles E. Tonry is named director of Processing division of Grand Junction operations office of U. S. Atomic Energy Commission. He comes to this post from Bureau of Mines, U. S. Department of Interior, Rifle.

Pacific Intermountain Express

Lewis H. Peterson joins staff in Denver as head of Engineering department. He was previously a product consultant for heavy duty truck division of International Harvester Co., Emeryville. *Richard F. Burris,*

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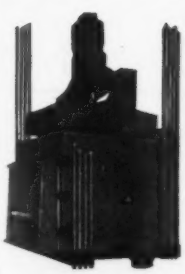

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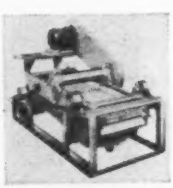

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WESTERNERS AT WORK

formerly a project engineer with Southwest Research Institute, San Antonio, Texas, joins Engineering department of P-I-E.

National Bureau of Standards

Samuel W. J. Welch, formerly administrative officer at naval ordnance laboratory, Corona, Calif., takes over as new executive officer of laboratories at Boulder.

Colorado Fuel and Iron Corp.

Lloyd W. Ingles is named superintendent of corporation's new Allen mine at Weston to succeed *H. D. Pinkney,* resigned. Mr. Ingles has been superintendent of CF&I's Fredrick mine.

Worcester Mines

John Hill is manager of this newly formed uranium producing company. He will headquarter at Grand Junction. He was formerly associated with U. S. Vanadium Co., a division of Union Carbide and Carbon Corp.

J. R. Simplot Co.

Philip T. Peterson is appointed manager of company's Colorado uranium division. He will maintain an office at Norwood.

IDAHO

U. S. Atomic Energy Commission

L. E. Johnston, manager of Idaho Operations office, resigns to join Taconite Contracting Corp., Duluth, Minn.

Bunker Hill & Sullivan Mining and Concentrating Co.

J. B. Haffner, formerly second vice president and general manager, becomes president. He succeeds *Stanly A. Easton,* retired. *John D. Bradley* takes over new office of executive vice president. *P. C. Feddersen* is named general manager and is replaced as smelter general superintendent of Bunker Hill's Kellogg properties by *Harold E. Lee.*

NEVADA

Manganese, Inc.

F. A. McGonigle becomes vice president. He will continue in general managership of concern's plant at Henderson.

OREGON

Oregon Steel Mills

William B. Jacobsen leaves mills at Portland and joins Southwest Steel Rolling Mills, Los Angeles, as plant superintendent. He is replaced as Oregon Steel's rolling mill superintendent by *K. B. McGlone,* formerly general foreman of a Midwestern structural rolling mill.

Skookum Co.

P. A. D. Hobbs is new partner of Portland concern which produces logging and construction blocks and forgings. He will serve as chief executive, while *J. B. Koeneke* guides engineering and production.

UTAH

Vitro Uranium Co.

William B. Hall is named general manager of this Salt Lake City division of Vitro Corp. of America. He was formerly its plant manager and vice president.

Kaiser Steel Corp.

John Peperakis is named manager of coking coal mines at Sunnyside. He replaces *Robert Heers,* recently moved to Kaiser's steel plant, Fontana, Calif. Mr. Peperakis was former assistant manager, Sunnyside.

Hercules Powder Co.

Norman L. McLeod, previously assistant manager, replaces *Joseph B. Talley* as manager of plant at Bacchus. Mr. Talley is transferred to firm's ammonia works, Louisiana, Mo.

WASHINGTON

M. L. Lee *D. Mayers*
Kaiser Aluminum & Chemical Corp.

Kaiser Aluminum & Chemical Corp.

David Mayers is appointed manager of company's foil and sheet expansion plans. *Marvin L. Lee* comes from Kaiser's extrusion plant, Halethorp, Maryland, to replace him as works manager of sheet plate rolling mill at Trentwood. *L. R. Babin* is named administrative assistant to plant manager of works at Tacoma.

Long-Bell Lumber Co.

John D. Leland is elected president. He succeeds *J. M. White,* retired. *H. G. Kelsey* is elected a vice president with headquarters at company's Western headquarters, Longview. He will be succeeded as general manager, Vaughn division, Vaughn, Oregon, by *Julian M. White, Jr.,* formerly assistant general manager of company operations at Weed, Calif.

Borden Company

William R. Moffitt, formerly manager of Chemical division's West Coast operations, with headquarters in Seattle, is named vice president and technical director of division.

Timber Structures, Inc.

William E. Welch, formerly manager of office at Seattle, is promoted to vice president, Western division, with headquarters at Portland, Ore. *Robert L. Brosy* replaces him in Seattle.

Pacific Northwest Alloys, Inc.

H. B. Megill, formerly executive vice president and general manager of operations at Mead, is named vice president and general manager of Chromium Mining & Smelting Corp., parent company. He is succeeded at Mead by *MacNeil E. Hertel,* formerly works manager there.

ASSOCIATIONS ELECT

Institute of Aeronautical Sciences:

President, *J. L. Atwood,* president, North American Aviation, Inglewood, Calif.

Nevada Mining Assn.:

President, *J. C. Kinnear, Jr.,* McGill, Nev., general manager of Nevada Mines division, Kennecott Copper Corp.; first vice president, *A. E. Millar,* Yerington, Nev., Anaconda Copper Mining Co.; second vice president, *Roy A. Hardy,* Reno, Nev., consulting engineer for Getchell Mines.

TRADE WINDS

News about those who distribute and sell industrial equipment and materials

Sales engineer for Connor Spring

Parker Jameson is appointed sales engineer for Connor Spring Manufacturing Co., working out of company's San Francisco plant. He was formerly purchasing agent for Monadnock Mills and, earlier, in production control and industrial relations positions for Douglas Aircraft Corp., Santa Monica.

P. Jameson
Connor Spring Mfg. Co.

A. P. Fetty, Sr.
Roylyn, Inc.

Fetty joins Roylyn

A. Preston Fetty, Sr., is Roylyn, Inc.'s new sales engineer serving industrial accounts in Southern California. At one time division sales manager for Shell Oil Co., Mr. Fetty has more recently traveled in Europe and Asia, as well as the United States, as an exporter and importer. Roylyn is a manufacturer of quick couplings, valves and related products, with headquarters in Glendale, Calif.

Newcomer to Pacific Coast

J. Wiley Thompson joins engineering staff of Pacific Coast Industrial Equipment Corp., Los Angeles. His previous experience in the design and construction of conveyors and materials handling equipment includes approximately 10 years with Palmer-Bee Co., Detroit; 10 years with Mechanical Handling Systems, Detroit; two years with Chain Belt Co., Milwaukee; and 13 years with International Conveyor & Washer Corp., Detroit.

Webber moves to Oakland

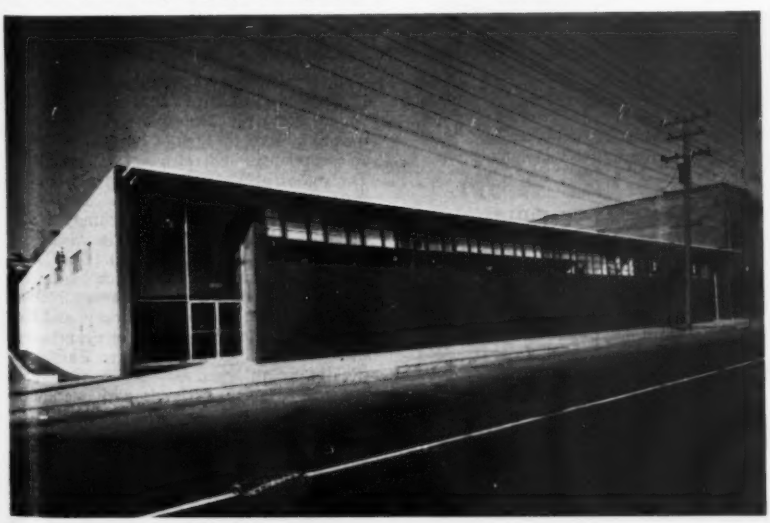
Kaiser Steel Corp. names J. H. Webber assistant manager of tubular products sales at its general offices in Oakland, Calif. He comes to the Bay Area from Tulsa, where he was Mid-Continent sales manager, and he has been with Kaiser's steel sales organization since 1946.

Enlist Peninsula Enterprises

Charles Vermilye Co., Los Angeles manufacturers' representative, appoints Peninsula Enterprises of Los Altos as its sub-representative in Northern California for the following products: industrial vacuum tubes manufactured by National Electronics, Geneva, Ill.; fractional horsepower motors and blowers made by Fairchild Industries, division of Fairchild Camera and Instrument Corp., Burlington, Vt.; torque and special motors of B. A. Wesche Electric Co., Cincinnati, O.; precision nuts manufactured by Westfield Metal Products Co., Westfield, Mass.; and metal tubing made by Uniform Tubes, Inc., Collegeville, Pa.

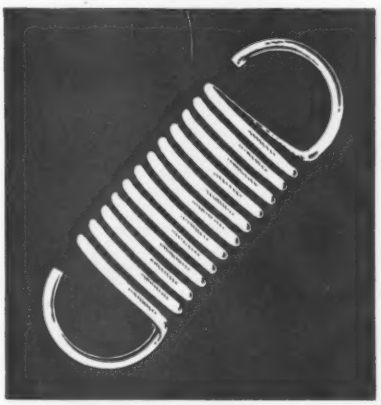
ACCO expands in San Francisco

American Chain & Cable Co. moves to new building in San Francisco, where it occupies 24,000 sq. ft. of floor space for warehouse facilities and offices. Architects were Wurster, Bernardi & Emmons; builders Midstate Construction Co., both of San Francisco. Warehouse will stock for immediate service such products as cable, wire rope, chain, welding rods and automotive equipment, and handle shipments of other company products. Area served is Northern California, Oregon, Washington and northeastern Nevada.



Springs that
"bend over backwards" in

QUALITY, DELIVERY PRICE!



Better springs make better products, so every order at Griffin is...

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1. Made by skilled workmen on the finest equipment
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3. Inspected to meet rigid standards
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XL TWIST DRILLS
Guaranteed to *last longer* than an ordinary drill!

Lower tool cost
Less downtime
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All sizes in stock
Try just one for comparison

Look at those smooth, uniform chips!

DoALL has carbide drills, drill sets, drill blanks, too.

Consult your classified phone directory for nearest DoALL Service-Store that stocks cutting tools, gages, supplies.

16

Call Your DoALL Service-Store

Machine Tools • Cutting Tools • Measuring Instruments
Shop Supplies • In Stock

The DoALL Company, Des Plaines, Ill.

Aero-Coupling plant addition

New addition totaling 5,400 sq. ft. is added to Burbank, Calif., plant of Aero-Coupling Corp., subsidiary of Aeroquip Corp. of Jackson, Mich. Addition will house brazing facilities to insure fast delivery on short-run items and sample parts; also new warehouse facilities and employee cafeteria. Company supplies flexible hose lines, self-sealing couplings, "Breakaway" couplings and brazed aluminum elbows.

TRADE WINDS

Neer transfers to Salt Lake City

Frank A. Neer is appointed to Intermountain District sales department of U. S. Steel's Columbia-Geneva Steel Division and moves to Salt Lake City from Los Angeles. He has been with U. S. Steel since 1948, and in Los Angeles since 1950 as a technical field representative.

Chase to sell stainless steel

Chase Brass & Copper Co., subsidiary of Kennecott Copper Corp., begins selling stainless steel, in sheet, bar, wire and tube form, from its 27 warehouses and sales offices throughout the country. Company will continue to market brass and other copper alloy products produced at its three mills in Waterbury, Conn., and Cleveland, O. Stainless steel is being handled through an arrangement with Crucible Steel Co. of America, Pittsburgh, Pa.

Move sales offices to Vernon

Bethlehem Pacific Coast Steel Corp. moves its sales offices to new quarters in Vernon, joining company's metallurgical, traffic and public relations departments. Present mailing address and telephone number remain the same.

Zenith Aircraft officers named

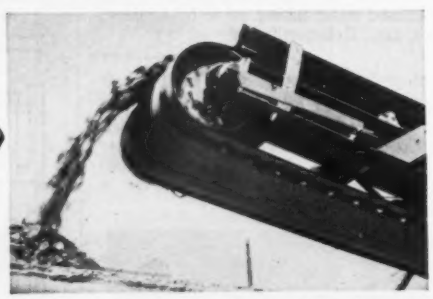
Zenith Aircraft, division of Zenith Plastics Co., Gardena, Calif., appoints following new vice presidents: Frank E. Wallis, vice president—sales; Charles Brucker, vice president—procurement; Wm. E. Braham, vice president—engineering; and Floyd H. Huhn, vice president—manufacturing. Victor Sokolove is elected treasurer of company, which manufactures reinforced plastic aircraft components.

Head new Westinghouse districts

Four district managers are named by Westinghouse Electric Corp., San Francisco, under new appliance sales reorganization by product group—major appliances, portable appliances and refrigeration specialties. The major appliance managers and newly created districts they serve are: Eugene J. Riley, Pacific Northwest (Washington and Oregon, with headquarters in Seattle); Harry B. Fay, Rocky Mountain (Utah, Idaho, Montana and Colorado, with headquarters in Denver); R. F. MacGillivray, Northern California (Northern California and Nevada, with headquarters in San Francisco); and Robert J. Moore, Southern California (Southern California, Arizona, Northwestern Texas and Hawaiian Islands, with headquarters in Los Angeles). Mr. Riley, Mr. Fay and Mr. Moore were formerly Westinghouse factory representatives for major appliances in Seattle, Salt Lake City and San Francisco, respectively. Mr. MacGillivray was appliance specialties representative in San Francisco.

YUBA-SCHROCK MOTORIZED HEAD PULLEY
For Belt Conveyors and Bucket Elevators

"PULLEY WITH THE DRIVE INSIDE"
Safe, compact, simple —no chains, no belts, no sprockets, no exposed motors.



Built by YUBA for sale in Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington.

Built and sold in other states by Iowa Manufacturing Company, Cedar Rapids, Iowa.

Pulley shell of this revolutionary head pulley rotates around electric motor and reduction gears, which are held stationary by torque arm attached to conveyor frame. Quickly installed—requires no more room than idler pulley. All moving parts protected against weather, grit, dirt. Diameters 10½" to 56". ⅓ to 125 hp. for voltages to 2300. Job proved.

Write TODAY for folder and name of nearest distributor.

YUBA DREDGES — PROVED DEPENDABILITY

YUBA MANUFACTURING CO.

Pulley and Sprocket Dept. 731 70
Phone 628 Benicia, Calif.

Mastick to head cylinder sales

Norris-Thermador Corp., Los Angeles, appoints Rodney J. Mastick manager of cylinder sales, to be in charge of all domestic and foreign sales. He was formerly Western sales manager of compressed gas cylinder division. Cylinders are used by producers of fire extinguishers, medical oxygen, acetylene, propane and other liquids or gases.

O. M. Abram
The Weatherhead Co.

R. J. Mastick
Norris-Thermator Corp.

Abram heads Weatherhead in West

Otto M. Abram is named Western zone manager of Aviation division and Industrial division of The Weatherhead Co., Cleveland, O., in a reorganization of company's sales division which will expand sales and engineering service in West Coast and Mountain areas. Assisting Mr. Abram will be Robert F. Peterjohn, Aviation division, and Russell E. Wolfe, Industrial division. Mr. Abram, who has been with company since 1935, is now in charge of sales of aircraft products and industrial line, which includes Ermeto fittings in steel, stainless steel and monel; brass fittings; industrial hose and reusable couplings; and permanently attached hose assemblies.

Rucker adds Donnell line

The Rucker Co., West Coast distributors and manufacturers of fluid and pneumatic power systems, is named Western distributor for hydraulic equipment made by Donnell Co. of Morengo, Ill. Headquarters of Rucker Co. are Oakland and South Gate, Calif., and Seattle, Wash. New distributorship covers California, Arizona, Nevada, Oregon, Washington and Idaho, as well as Hawaii and Alaska.

New Allis-Chalmers distributor

Oregon Transformer Works, Portland, is named distributor and certified service shop for Allis-Chalmers transformers in state of Oregon and five southwestern counties of Washington: Clark, Cowlitz, Klickitat, Wahkiakum and Skamania. Virgil F. Hurst is owner of Oregon Transformer Works.

Nordean named sales chief

Minnesota Mining & Manufacturing Co. appoints Maurice E. Nordean to post of office manager of company's Seattle sales branch. He has been with 3-M since 1950.

Changes at Leach Corp.

R. B. Hutton is named vice president in charge of sales for Leach Corp., Los Angeles, and its divisions, Leach Relay Co., Inet, Palmer Electric Mfg. Co., and Jeffries Transformer Co. Mr. Hutton joined Leach several years ago with 15 years of sales management and sales engineering experience in electrical fields. James K. Dysart is appointed sales manager for Leach Relay Co. He was formerly divisional sales manager for Parker Aircraft.

New welding supply dealer

Western Welding Supply opens in a new building at Baldwin St. and McClary Ave., East Oakland, Calif., to handle oxygen and acetylene gases and welding supplies of National Cylinder Gas Co., San Francisco. Company is a partnership formed by Joseph McIntyre and Fred Jordan. In addition to selling welding and cutting supplies, firm will offer a guaranteed maintenance service on welding equipment, on a flat-fee basis, covering periodic check-ups and minor repairs.

Chiksan promotion

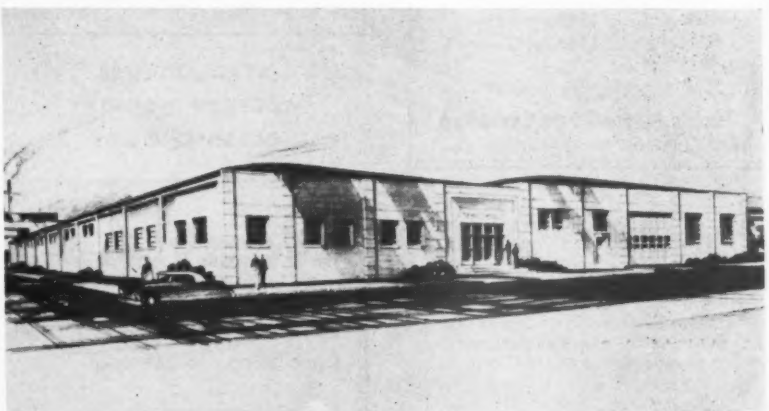
H. J. Schlarb is named to newly-created position of special representative in sales department of Chiksan Co. and Chiksan Export Co., Brea, Calif. He has been with company over nine years, and his new position will include handling special assignments and projects.

Browne heads Western Division

R. W. Browne is appointed manager of Western Division, Airtherm Manufacturing Co.'s heating division. He has managed

White Motor Co. builds in Portland

Construction begins on new building to house Portland branch of The White Motor Co. Floor space of 30,000 sq. ft. will house a complete machine shop, dynamometer, frame straightener and other maintenance and repair equipment. Service yard of over 60,000 sq. ft. is planned. Portland branch manager for White is H. D. Collins; service manager, J. H. Howell; and parts manager, Lue Warner.



MILLER-ROBINSON CO.

HIGH FREQUENCY INDUCTION PROCESSING

SILVER BRAZING

LOCALIZED HEAT TREATING

Production — Tooling Engineering — Equipment

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HIGH PRESSURE CLEAN UP—
Faster, Easier, Cheaper

NOW BEING CLEANED BETTER in less time with less water and work by

Greasy floors, mud-encrusted trucks, transit concrete mixers, power line insulators, coal cars, paper plant rollers and screens, building exteriors, boilers, meat washing, zinc chromate protected aircraft, conveyor belts, and thousands more.

BEAN HIGH PRESSURE PUMPS

ARE YOU WASTING TIME AND MONEY WITH OLD-FASHIONED CLEANING METHODS? There is a BEAN factory engineer or dealer nearby to help you with your particular high-pressure and/or low volume pumping requirements. Write for his name and for descriptive literature.

FOOD MACHINERY AND CHEMICAL CORP. John Bean Division · Dept. WI P. O. Box 145, San Jose 1, Calif.

fmc TRADE MARK

CLASSIFIED SECTION

Space is sold as advertisers' inches. All advertisements in this section are ⅛ inch short of contracted space to allow for borders and composition. Rates are $7.50 a column inch. Copy should be sent in by the 25th of preceding month if proofs are required; by the 28th if no proofs are required.

FOR SALE

FOR SALE

Two Used Gisholt, Platen Type, Simplematic Lathes. Serial Nos. 4-18515 and 5-18515. Each with 3 tool slides. 21¾" swing over tables, 33½" swing over ways. 7½ and 10 hp. 220-3-60 motors, 7½ hp. has spindle speed 11-65 RPM or 21-126 RPM. 37" x 37" tables, 3-jaw and 6-jaw 18" air-operated chucks. Chain drives. Wrenches, 2 extra tool slides. 1 compound rest.

CREATIVE METALS CORPORATION
Phone OLympic 3-8300
1290 Powell St. Emeryville, Calif.

FOR SALE

3,000 Gallons Permatex Form-A-Gasket Number 1

List Price .....$8.75 per Gallon
Dealer Cost....$5.25 per Gallon
Jobber Cost....$3.96 per Gallon
OUR PRICE....$1.00 per Gallon

Minimum Order
50 Gallons

Pacific Motor Parts Company
1517 Park Street Alameda, Calif.

Surplus—Acme Steel Strapping

½" & ⅝"	020	.16 lb. 1 to 4 coils
		.15 lb. 5 coils
¾"	020	.18 lb. single coils

FOB Bay Area
DOMESTIC COMPANY
829 21st St., Oakland, Calif. TWinoaks 3-4186

Pipe Repair CLAMPS

Made for every type of leak—any temperature or pressure. Send for Catatog No. 41-O.
M. B. SKINNER CO., SOUTH BEND 21, INDIANA

ENGINEERING DESIGN SERVICE
CAPACITY AVAILABLE
Metal Fabrication; Automatic Machinery; Product Development—Cost Reduction and Drafting Work
Directed by M.A.S.M.E. and M.I.M.E.
Box 8A, Western Industry, 609 Mission, San Francisco

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FREE DELIVERY ANYWHERE
MADE DIRECT FROM PHOTOS (OR NEGATIVES) • 50 8 x 10 13¢ ea • 500 8 x 10 8¢ ea
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POSTCARDS
5000 $21 PER M. 2½¢ each in 1000 lots
SAVE THROUGH QUANTITY PRODUCTION
FOR COMPLETE PRICE INFORMATION WRITE OR PHONE:
QUANTITY PHOTOS, Inc.
HOllywood 7-6179
5509 SUNSET BLVD., HOLLYWOOD 28, CALIF
LARGEST PHOTO REPRODUCTION PLANT IN WEST

DISTRIBUTORSHIP WANTED

Successful Manufacturers' and Distributors' Representative wants another profitable line for Northern California. Aggressive. Write
PENINSULA ENTERPRISE
291 Main Street LOS ALTOS, CALIFORNIA

TRADE WINDS

Western sales of Airtherm machinery division since 1952, and has offices in Oakland, Calif. Airtherm headquarters are St. Louis.

New title for Kanavel

Charles H. Kanavel, Los Angeles district manager of B. F. Goodrich Co. tire and equipment division, is named Western zone manager for aeronautical sales department as well. In his new post he will supervise activities of Seattle, San Francisco and Los Angeles districts, but will continue to headquarter at Los Angeles plant. Mr. Kanavel has been with Goodrich since 1933, for past eight years as Los Angeles district manager.

Transferring to Northwest

R. J. Horrocks, manager of Salt Lake City branch of Thor Power Tool Co., Aurora, Ill., moves to Seattle as manager of that sales and service branch. He joined Thor as a service engineer in 1948, specializing in sales of pneumatic and high frequency electric tools in Salt Lake area until 1952, when he became manager.

Thor's Seattle branch is being expanded to include entire state of Washington, northern Idaho and northwestern Montana.

W. R. Walinski, service engineer in Utah-Montana-Idaho territory, transfers to Spokane, where he will help to serve new area under supervision of Seattle office.

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Send ad to Classified Dept.,
WESTERN INDUSTRY, 609 Mission St., San Francisco 5, Calif.

THE West ON ITS WAY

NEW PLANTS, EXPANSIONS, NEW INDUSTRIES, PRODUCTION CONTRACTS, DEVELOPMENT PROJECTS, UTILIZATION OF RESOURCES

Still above, but not so much so

In all major sections of its economy the 12th Federal Reserve District experienced a higher rate of employment growth from 1952 to 1953 than the nation as a whole, the Federal Reserve Bank reports, although it joined in the same general slowdown toward the end of the year.

Food processing and paper and pulp, however, showed no signs of weakness, according to the Bank. In general, the economic behavior of the 12th District paralleled the country as a whole more closely than for several years past.

Non-agricultural employment in the District rose by 3.2%, or 179,000 persons from 1952 to 1953, while the manufacturing employment gain was 5.2%.

Indexes of Industrial Production 12th Fed. Res. Dist.

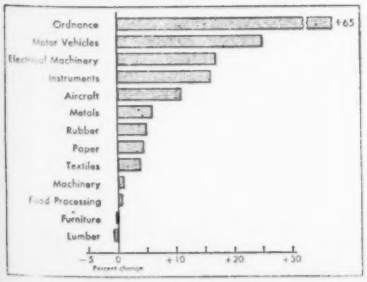
(1947-49 = 100)

Industrial Production	1950	1951	1952	1953p
Copper	113	115	112	111
Lead	109	93	86	74
Zinc	101	95	88	73
Silver	122	114	111	105
Gold	117	99	88	89
Iron ore	119	178	162	204
Steel ingots	126	147	139	158
Aluminum	119	126	121	164
Petroleum	98	106	107	109
Refined oils	103	112	116	122
Natural gas	100	98	94	101
Cement	112	128	124	130
Lumber	112	113	107	110
Wood pulp	120	140	148r	157
Paper	109	120	122	128
Douglas fir plywood	142	160	170r	195
Wooden boxes	94	96	92	87
Canned fruits	96	121	103r	110
Canned vegetables	110	172	162r	143
Meat	103	108	116	128
Sugar	105	98	95	113
Flour	86	95	96r	96
Butter	99	76	65r	90
Cheese	104	105	106	—
Ice cream	94	99	113	—
Canned fish	122	95	85	67

p Preliminary.
r Revised.
Note: Data given above supersede all previously published annual indexes.

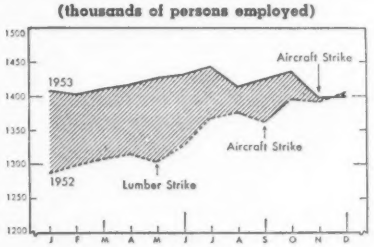
Non-Agricultural Employment in selected major groups 12th Fed. Res. Dist.

(Per cent change in average monthly employment, 1952-1953. Source: Cooperating state agencies)



Manufacturing Employment 12th Fed. Res. Dist.

(thousands of persons employed)



Upturn expected in Columbia Empire area

Business prospects for members of the Columbia Empire Industries, Inc., seem to be good. Fifteen of them have reported better prospects for the balance of 1954 compared to a year ago, while seven expected conditions to be the same and only two poorer.

Seven are planning expansion in building and ten in equipment, with approximate cost $7,120,000.

As for the general situation with each company compared to a year ago, nine said it was better, nine the same and seven poorer. Six companies have more employees than a year ago, 18 the same number, while two have less.

Construction costs leveling

The leveling-off process in the replacement cost of construction and equipment items continues, according to the U. S. Appraisal Co., whose building cost index for the West Coast declined from 218.1 in November 1953 to 217.6 in March 1954.

Alfred V. Perthou, president, says a definite net increase in cost has set in, due to several factors not influenced by indexes. Labor efficiency has increased, keener competition has sharpened bidding, and the result has been lower bids and increased prevalence of trade discounts.

American Appraisal Co. indexes for four Western cities, which apply to construction only, and do not include fixture items such as plumbing, heating, lighting, sprinkler system, etc., are as follows:

	Jan.	*Feb.*	*March*
Denver	517	517	518
Seattle	567	567	580
San Francisco	522	522	529
Los Angeles	550	550	550

The above figures reflect the cost trend in each city, but not the relative trend between cities. *Western Industry* has not attempted to ascertain the cause for the advances in Seattle and San Francisco, but American Appraisal attributes a slight national rise to wage increases and added fringe benefits.

Western plastics growing

The number of plastics fabricators in the eleven Western States increased from 2% of the national total in 1950 to 4% at the end of 1952, a study by the San Francisco Chamber of Commerce reveals. The Western plastics market is expected to be 35% greater by 1960 than in 1950.

It also shows that the surface coatings industry in the West consumes $22,000,000 worth of resins annally.

More titanium deposits revealed

Large deposits of iron ore, much of it rich in titanium, have been revealed by exploratory drilling in southeastern Wyoming by the Union Pacific R.R.

Probing of near-surface deposits prior to 1953 indicated the existence of some 178,000,000 tons of ore. Further drilling by Union Pacific geologists last year is now estimated to have added 50,000,000 tons to the total.

A section of the May 1954 issue of **WESTERN INDUSTRY—609 Mission Street, San Francisco 5, Calif.**

ANNIN CO. EXPANDS PLANT—The Annin Co., Los Angeles, moves into new plant providing over 30,000 sq. ft. for expanded design and manufacture of automatic control valve equipment for process industries, as well as research and development of valves in special fields such as guided missiles and atomic energy.

ARIZONA

NEW CONSTRUCTION TOOL—Manufacture and national distribution of a formbinder strapping tool invented by Kenneth Kistler, Phoenix, is begun by A. J. Gerrard Co., Chicago. Tool, which is used in lining up and strapping together wooden forms for concrete, has been developed and tested over past five years on construction jobs of Del E. Webb and Robert McKee construction companies. Its inventor operates Kistler Industrial Service, Phoenix.

HUGHES AIRCRAFT CO., TUCSON—Hughes asks for construction bids on new facilities for final assembly and check-out, to cost between $1,500,000 and $2,000,000, at its Tucson guided missile plant. Engineering design of the addition is being done by Holms & Narver of Los Angeles. Facilities are scheduled for completion in January 1955.

RECOMMEND NEW INDUSTRY—Research group from U. S. Forest Products Laboratory, Madison, Wis., recommends to Phoenix businessmen that newsprint paper mill be established in Arizona. Mill would use Arizona forest resources and water and power needs could be met by sources of supply in the area. Two groups of investors are reportedly interested in project.

CEMENT PIPELINE OKAYED — State Highway Commission tentatively approves use permit for Halliburton Portland Cement Co. to lay pipeline along Black Canyon highway from Copper Canyon to Phoenix. Company plans to transport solution of finely crushed rock and water in pipeline for processing into cement at proposed Phoenix plant. Approval is reportedly subject to possible legal restrictions.

AIR BASE PROJECT — House Armed Services Committee approves $3,034,000 construction projects at Davis-Monthan Air Force Base, Tucson. Work covers improving runways and building extra shop and maintenance facilities.

COPPER MINE OPENS — Silver Bell copper mine, owned by American Smelting and Refining Co., successfully completes 30-day trial run and begins production under government contract. New mine, located 40 miles west of Tucson, will produce about 18,000 tons of copper a year for next five years, employing about 250 men at mine.

BUY LEAD-ZINC MINE—Illinois Zinc Co. agrees to buy Shannon mine at Gleeson, 16 mi. east of Tombstone, for $50,000. Property and two shafts of mine, which has been operated for only short periods since 1919, will be rehabilitated, according to present plans.

PHOENIX DRAWS AIRCRAFT FIRM—Babb Co., Inc., subsidiary of Atlas Corp., plans to transfer machine shops and warehousing operations from Glendale, Calif., and Seattle, Wash., to Phoenix, where it will build $1,500,000 plant at Sky Harbor Airport. Construction will begin by July, according to company's plans, on proposed 33-acre site. Four proposed buildings will include one to house propeller and accessory shop and one for major engine overhaul. About 10,000 sq. ft. will be used for offices. Plant will employ 50 people at start, and an estimated 1,500 in full swing.

ON THE BEAM—Kent Stevens, inventor of new automatic station locator, forms partnership in Phoenix with Leonard Pemberton, under company name of Aircraft Specialty Line. Scheduled production is 500 instruments in next three months. Device is a simplified 4-lb. aircraft navigation aid which tunes in to regular commercial radio stations or CAA radio ranges.

ANOTHER AiRESEARCH ADDITION—Garrett Corp., Los Angeles, authorizes $300,000 addition to engineering section of its subsidiary, AiResearch, in Phoenix. This is independent of large-scale construction already under way at plant.

CALIFORNIA

FORM ELECTRONICS FIRM — Levinthal Electronic Products, Inc., is organized in Redwood City. Company will specialize in electronic medical instruments, with research, development and merchandising of other products in applied physics and electronics. President is Dr. Elliott C. Levinthal, former chief engineer of Century Electronics; vice president, Albert J. Morris, who was formerly head of Morris Defibrillator Co.

MOVE BORAX PLANT—Borax refining plant of Pacific Coast Borax Co. moves from Wilmington to Boron, location of company's mine operation and another plant. Additional 500 men will be added to force of 700 at Boron.

CLOVERDALE REDWOOD—New corporation, Cloverdale Redwood Co., is organized in Cloverdale and buys part of assets of Coastal Plywood & Timber Co. for $4,500,000. President of new firm is W. M. Moores of Ukiah. Backers of firm also hold interests in Hollow Tree Lumber Co. of Ukiah and Mollala Forest Products of Oregon.

ULTRA-VIOLET BUYS FIRM — Ultra-Violet Products, Inc., of South Pasadena acquires Vogel Luminescence Corp., San Francisco, which manufacturers luminescent, phosphorescent and fluorescent paints. Sales distributor of Ultra-Violet Products, Black Light Corp of Northern Calif., will move its offices from Berkeley to former Vogel headquarters, now luminescence division, in San Francisco.

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Ultra-Violet Products is said to be largest manufacturer of black light fixtures in West.

ELECTRONIC RELAY CONTRACTS—U. S. Relay Co., Los Angeles, receives $100,000 contract for electronic relays from Lockheed Aircraft Corp., Burbank, in addition to recently awarded contracts from North American, Glenn L. Martin and Bell Aircraft.

WORK ON JET AIRCRAFT — Lockheed Aircraft Service, Inc., Burbank, receives $3,500,000 contract from U. S. Air Force for modification of F-80 aircraft. Work includes installing new model J-33-35 engines, ejection type seats, latest type radio and other improvements, as well as maintenance service. Delivery in September is planned.

BUILD SAN LEANDRO PLANT—Foxboro Co. of Foxboro, Mass., manufacturer of industrial instruments for process measurement and control, begins construction of 8,400 sq. ft. plant in San Leandro. Facilities will more than double present production area of San Francisco shop.

SAN JOSE QUARTERS FOR DOLE—Dole Sales and California Production divisions of Dole Hawaiian Pineapple Co. will occupy in early 1955 new two-story building in San Jose now under construction by Carl Swenson Co., Inc., San Jose. Building site adjoins present Dole plant. Some warehouse sections of new facility will be ready for use about July 15; entire building will be completed around middle of December. Architects for new building are Binder & Curtis, San Jose. Structural engineer is W. D. Lotz; mechanical engineer, Richard E. Gurries; and electrical engineer, George Ninnis. Present offices of Dole Sales are in San Francisco.

BUY PLANT AND PRODUCT—Electric Machinery Mfg. Co. of Minneapolis, subsidiary of Worthington Corp., acquires Mullenbach Electrical Manufacturing Co., Los Angeles, manufacturer of new electronic control device, "Capaswitch." Worthington plans to expand production of Capaswitch, now being manufactured on small scale at Mullenbach plant. Los Angeles plant, to be operated as Mullenbach division of Electric Machinery, will also continue its other manufactures, including switchboards, panel boards and electrical controls.

NEW VENTURE FOR STANDARD OIL—Site preparation is under way at Richmond for new multi-million dollar chemical plant for production of isophthalic by Standard Oil Co. of California. Plant, scheduled for completion in mid-1955, will have capacity of 50,000,000 lb. per year of isophthalic, new raw material for plastics and enamel industries. Manufacturing process, invented and developed over past eight years by California Research Corp., uses metaxylene from Standard's catalytic reforming operations at Richmond. Product will be marketed by another Standard subsidiary, Oronite Chemical Co.

PG&E BID—Pacific Gas & Electric Vice President Robert H. Gerdes, in San Francisco hearing of Hoover Commission task force on water resources and power, states company is willing to buy all existing power transmission lines, switchyards and substations of federal government's Central Valley Project at their present value and market all power produced through PG&E transmission and distribution network. Bureau of Reclamation supports continuation of independent transmission system completed in 1951, which terminates at Tracy, 200 miles to south of power plants.

CEN-VI-RO PIPE — New company to produce rubber-gasket-joint pressure pipe is formed by Morrison-Knudsen Co., Inc., Boise, acting with Raymond Concrete Pile Co., New York, and George R. Jessen, Salt Lake City. Company, renamed Cen-Vi-Ro Pipe Corp. and moved to South Gate, Calif., is a reorganization under new ownership of former Cen-Vi-Ro Manufacturing Corp. of Nampa, Idaho. Firm name refers to patented centrifugal, vibrating and rolling process used in manufacture of special reinforced-concrete pipe. President of new firm is J. B. Bonny, vice president and general manager of M-K.

FIRST WESTERN PLANT — National Can Corp., Chicago, is surveying possible plant sites in San Francisco Bay Area for building its first plant in the West. Cost of plant will reportedly amount to several million dollars. Production will at first be limited to fruit and vegetable cans, and later expanded to include beer and soft drink cans. Company is also considering long-range plans for building additional plants on West Coast.

EASTERN PLANTS FOR GARRETT—Garrett Corp. of Los Angeles acquires three companies in East in move to expand their sales and manufacturing activities: Aero Engineering, Inc., Akron, O.; Aero Sales Engineering, Ltd., Ottawa, Canada; and Air Cruisers Co., Belmar, N. J.

NEW STEEL DRUM COMPANY—Atlas Steel Container Co. is formed in Los Angeles by Hyman Levine, president of H. Levine Cooperage Co., steel drum reconditioner. New company, capitalized at $1,000,000, will manufacture steel containers.

"NEW IDEA" FACTORY — Plans for new corporation, Hunter Engineering Co., to carry out advanced industrial research in development of new products and processes, are presented before Los Angeles County Planning Commission by Joseph Hunter, president of Hunter Douglas Corp. Staff of about 150 scientists, engineers and technicians would use 185,000 sq. ft. plant to be built east of Riverside for research in metallurgical, electronics, plastics and related fields.

GENERAL DYNAMICS-CONVAIR — Stockholders of both corporations approve merger of Consolidated Vultee Aircraft Corp., San Diego, and General Dynamics Corp., Dover, Del. Convair will retain its name, present officers, and organizational structure. Total estimated employment of merged firms is now 63,000.

TO CONSOLIDATE OFFICES—Holly Sugar Corp. plans new office building on 2-acre site in San Mateo which will bring together company's offices on West Coast. Production, agricultural and accounting departments now in Stockton, Western sales office now in San Francisco, and engineering department now at Alvarado will be consolidated in one administrative headquarters.

ARMOUR IN LOS ANGELES—Curled Hair division of Armour & Co. will occupy new 35,000-sq. ft. processing plant in Central Manufacturing District of Los Angeles, under 25-year lease arranged by Gateway Property Co. Plant investment will be about $500,000, for production of cushioning material from animal hair.

BUY STEEL PROCESS PLANT—Earle M. Jorgensen Co., Los Angeles, acquires processing facilities and inventory of Gilmore Steel & Supply Co., Inc., in Los Angeles. Operations will continue at Gilmore plant until fall, when they will be moved to new building to be added at main Jorgensen plant. Gilmore will continue activities in Portland, Oakland and San Francisco.

ORDNANCE CONTRACT FOR FMC—Food Machinery and Chemical Corp., San Jose, is awarded Army Ordnance contract extending production of M59 armored infantry vehicles. Original M59 contract was given FMC in December 1952. Under new agreement, monthly rate of production will be reduced to most efficient and economical rate of output consistent with needs of Army.

ACQUIRE SOUTH AFRICAN FIRM—Food Machinery and Chemical Corp., San Jose, buys controlling interest in Morris & Martin Ltd., engineering and manufacturing firm in Port Elizabeth, South Africa. Construction of new manufacturing plant is planned.

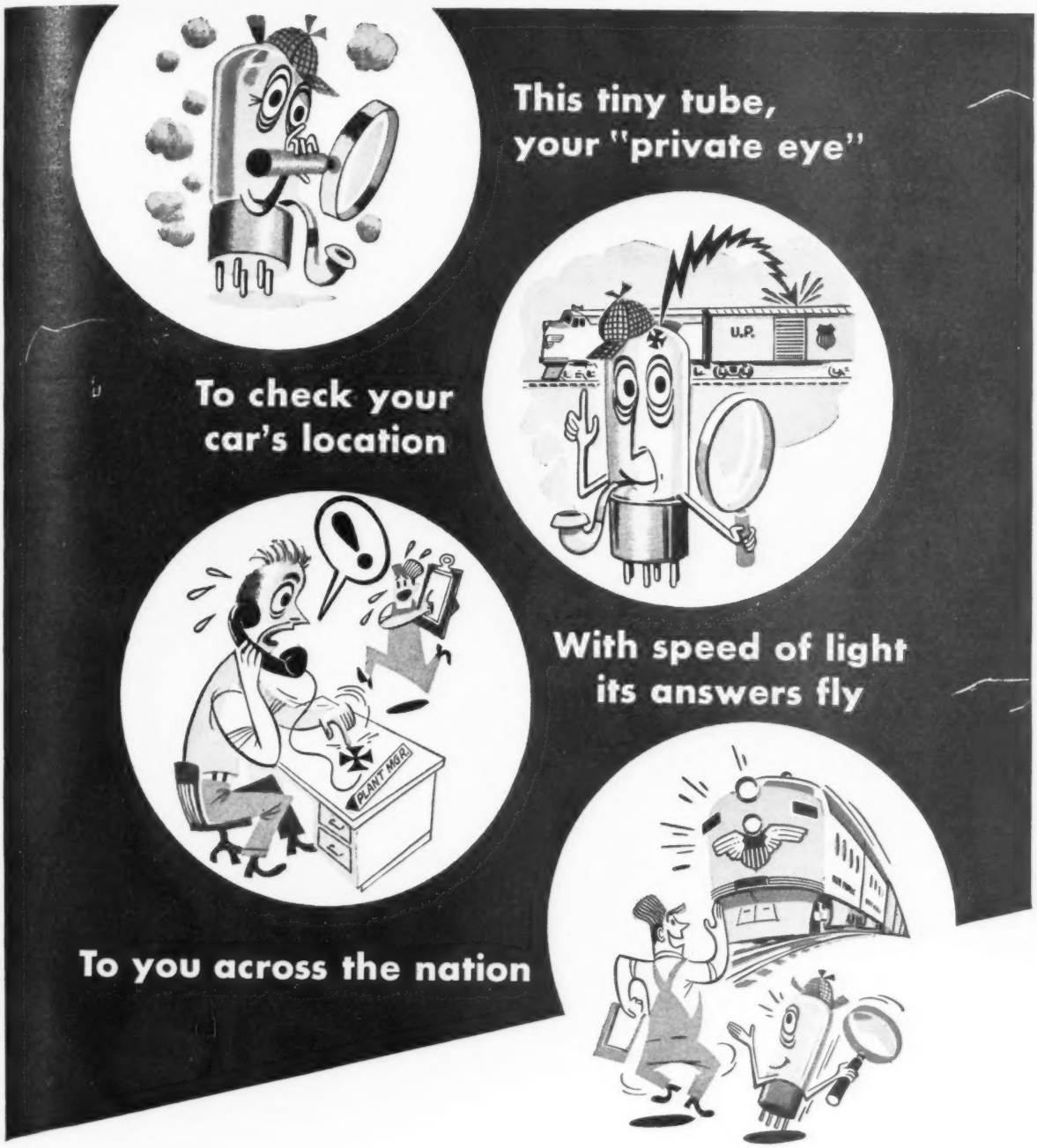
MORE APPLE SAUCE — Sebastopol Cooperative Cannery, Sebastopol apple sauce canner, is building new plant adjacent to present building which will provide capacity for increasing output to around 1,000,000 cases, which is double the output of cannery last year. Present plant will be converted to warehouse. Plant manager is Carroll Farmer.

800 ACRES FOR GROWTH—Chamber of Commerce industrial committee of Lodi plans development of 800-acre tract to be annexed by the city for future location of new industries.

ATOMIC PLANT FOR NORTH AMERICAN—North American Aviation, Inc., is granted special-use permit by Ventura County Board of Supervisors for additional 1,100 acres south of Santa Susana, to be used for construction of atomic power plant and expansion of other activities in area. Company now uses about 700 acres at this location for rocket fuels testing, employing about 650 persons. Agreement to build $10,000,000 atomic plant for Atomic Energy Commission has not been completed and reportedly still requires approval of advisory committee on reactor safeguards.

NEW METAL PROCESS—Powder Melting Corp. is organized in North Hollywood for development of new methods of applying powdered metal to steel parts to increase resistance to abrasion, high temperature and corrosion. President is Robert E. Jones, also president and general manager of Superweld Corp. Vice president is A. T. Cape, and secretary, M. H. Hass, both vice presidents of Superweld; treasurer, Francis A. Gudger.

MOJAVE CEMENT PLANT—California Portland Cement Co. plans to build new cement plant with capacity of over



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2,000,000 bbl. in area of Mojave. Engineering plans and specifications are now being prepared, and production is scheduled to begin in 1955. Company now operates plant at Colton and a subsidiary at Rillito, Ariz.

PRODUCE CEMENT BLOCKS — New plant at Littlerock Wash, in Mojave Desert, owned by George Shaw, begins production. Operations are automatic except for weighing of raw material. Plant has design capacity of 500 blocks per hour.

BUY ACME—California Brewing Co., San Francisco, acquires Acme Brewing Co. plant in San Francisco for $6,000,000. Miguel Quirno-Lavalle, president of California Brewing, is associated with Liebmann Breweries in New York, and Philip Liebmann, who is president of the New York firm, is chairman of the board of California Brewing.

FILM LABORATORY SOLD—Houston Color Film Laboratories, Inc., of California (Burbank) and Houston, Fearless Corp. (West Los Angeles) acquire Color Corp. of America from Donner Corp., Philadelphia investment firm. Two purchasing firms are affiliated through management. Ray C. Wilcox, president of Houston, Fearless, is elected president of Color Corp. to succeed W. R. Yarnall, resigned.

ANOTHER SANTA MONICA PLANT —Douglas Aircraft Co., Inc., may purchase site now used by Culver City stadium, to be replaced by new buildings for offices, warehouses, and facilities for aircraft manufacture and subassembly. Price of property, owned by Mrs. Louisa Holm, is $400,000. Purchase depends upon rezoning of area for light manufacturing.

BUY WESTERN FOOD PLANT—Dennison's Foods, Oakland, is acquired by American Home Foods, Inc., a subsidiary of American Home Products Corp. of New York. Dennison's plant, which regularly employs about 200 people, packs tomato products and such foods as chile con carne, beef stew and pork and beans.

COLORADO

BROADEN METALS PROGRAM—Climax Molybdenum Co., New York, plans expansion of its uranium operation on Colorado plateau conducted by its subsidiary, Climax Uranium Co. Plans include building new milling facilities and acquiring additional uranium deposits. John H. White, Jr., is named president of uranium company, succeeding Carroll L. Wilson, who becomes director of industrial development of Climax Molybdenum. Company will also undertake diversification program to develop or acquire new metals and alloys projects in U. S. and abroad. Improvements at Climax Molybdenum mine in Colorado have recently been completed at cost of $35,000,000.

NEW PLANT AT ALAMOSA—Valley Fertilizer Co. begins production of commercial mixed fertilizer in new $100,000 plant at Alamosa. Plant, which now employs 20 men, will operate twelve months of year, with heavier production during growing season. Rated capacity is 12 tons per hour, using ammonium nitrate, phosphates and potash ingredients.

IDAHO

NEW FERTILIZER COMPANY — N'Land Empire Industries, Inc., is organized by group of former executives of J. R. Simplot Co. to carry out plans for liquid fertilizer blending plants at Craigmont and Lewiston originally proposed by Simplot and then abandoned. Craigmont plant will be in production shortly, with capacity of 100,000 gal. daily. Blending plant and retail outlet are planned for Lewiston. President of new firm is E. W. Hansen of Boise; vice president, J. W. Lofquist.

SEEK FRANCHISE—Pocatello Natural Gas, Inc., is incorporated by Pocatello businessmen and applies for franchise to furnish natural gas for area. Negotiations have reportedly begun with Pacific Northwest Gas Co. and Trans-Northwest Gas Co., looking ahead to a decision on supplier of natural gas to Northwest.

TO BUILD PLANT IN BOISE—Great Western, Inc., new firm organized by Kenneth A. Arnold and Henry F. Reed, plans to build plant on 40-acre site in Boise for manufacture of airplane ski wax, new airplane hangar developed by Arnold, and other products. New firm absorbs business of Great Western Fire Control, also owned by Arnold.

NEVADA

REFUSE NEW INDUSTRY — Advisory council of Boulder City rejects application for 25 acres of land by group which reportedly sought to build $1,000,000 plant in city. Opposition was based on insufficiency of water and power, tight housing conditions, and threat of air and water pollution.

NEW MEXICO

ATOMIC CONTRACT RENEWED — Western Electric Co. signs new contract with Atomic Energy Commission for continued operation until the end of 1958 of Sandia Laboratory at Albuquerque. Work is performed by Sandia Corp., subsidiary of Western Electric.

OREGON

NEW POWER COMPANY — Pacific Northwest Power Co. is incorporated in Salem for $50,000,000. Backed by five Pacific Northwest utility companies, new organization will develop and finance two hydroelectric projects in northwestern Idaho.

SHIP REPAIR CONTRACT — Albina Engine & Machine Works, Inc., Portland, after competitive bidding is awarded $500,000 ship-repair contract for rebuilding interior of Standard Oil Co. tanker.

FEED MILL—Swift & Co. feed mill begins production in North Portland, adjoining Swift meat packing plant. Output of livestock and poultry feeds will go to Oregon, Washington and Idaho markets. Mill was built by Ken Ward Construction Co.

CHROME MILL — Grant County Chrome Corp., is organized for purpose of operating chrome mill east of John Day. Plant will do custom milling of chrome mined locally. Company is owned by Endre Norem, Hohokus, N. J., and Alwyn H. and Marion Wild, New York.

CONVERTING SEAPLANES — New Portland aircraft firm run by Angus McKinnon and Vernon Hickman, is converting Grumman Widgeon seaplanes, by addition of new engines, constant speed propellers, cowlings, cooling systems and sound-proofing, into exclusive "Super-Widgeons," which take off faster and fly at higher speeds.

TO MAKE BRICK AND TILE—Newly organized Camas Mountain Clay Corp. will begin construction this summer of a ceramic factory in Douglas County, to supply southwestern Oregon with tile and brick. Founders of company are C. M. McDermott, Dudley C. Walton and James G. Richmond.

BUILD WAREHOUSE—New $500,000 warehouse will be erected in Portland for American Steel Warehouse Co. by parent company, Pacific Blow Pipe Co.

PORTLAND OFFICE FOR S. R. I. — Stanford Research Institute, Palo Alto, sets up office in central business district of Portland, to conduct research program on long-range development of power and water resources of Pacific Northwest. Manager of new division is Patrick M. Dowling. One of first projects will be study of Oregon's resources and industrial growth potentials as a part of SRI's Western Resources Handbook service.

UTAH

MILL AT MOAB — Utex Exploration Co., headed by Charles A. Steen, will join with Combined Metals Reduction Co. interests in building $4,000,000 uranium mill at Moab. Newly formed Uranium Reduction Co. will construct the concentrator, on site adjoining ore-sampling operation of Atomic Energy Commission. Actual construction is expected to start before autumn, following AEC approval of project. Concentrator will process all ore from Utex's Mi Vida mine as well as serving other uranium producers in southeastern Utah.

ROOFING FIRM EXPANDS — Ruberoid Co., Salt Lake City, undertakes $500,000 expansion of facilities, to include construction of warehouse and installation of new machine for production of asphalt shingle. Distributors for shingles are Tri-State Lumber Co. and Boise-Payette Lumber Co. Company also manufactures battery case materials.

GENERAL MOTORS CONTRACT — Contract for construction of factory branch for General Motors Corp. Electro-Motive division north of Salt Lake

City is awarded Ragnar Benson, Inc., Chicago, for undisclosed sum. Previous estimates on cost of plant were $750,000, with same amount for installations and equipment. Factory will rebuild diesel locomotives and serve as parts distribution center.

NEW PRODUCT FOR SALT LAKE—Dunfield-Durkee, Inc., Salt Lake City, begins manufacture of electrical trimmer for hedges, shrubs, and lawn-edging, invented by John McMillan of Elko, Nev. McMillan is vice president of new company, which is headed by Fred C. Durkee, retired grocery chain executive. Output of plant at present is 500 trimmers weekly.

WASHINGTON

PLANT AT PASCO—Canadian interests are reportedly backing a proposed ammonia and urea producing plant at Pasco, to cost $10,000,000 to $12,000,000.

PETROLEUM TERMINAL — Terminal for handling tetraethyl-lead anti-knock compounds will be built by October for E. I. du Pont de Nemours & Co. near General Petroleum refinery under construction at Ferndale.

KAISER BEGINS SURVEY — Kaiser Aluminum and Chemical Corp., Oakland, establishes field engineering group in Spokane to prepare plans and conduct survey of sites in British Columbia for possible hydroelectric power development. Group is headed by Col. H. G. Gerdes, retired member of U. S. Corps of Engineers, and S. O. Harper, former chief engineer of Bureau of Reclamation at Denver.

REVERE PLANT AT BELLEVUE — Revere Instrument Co. opens new plant in Bellevue, near Seattle, for development of hydraulic and pneumatic valves for aircraft industry. Company is a subsidiary of Revere Corp. of America, Wallingford, Conn.

HARDBOARD PLANT ADDITION — Long-Bell Lumber Co. begins addition to its Longview hardboard plant, which will have 55-ton daily capacity, employing 70 people.

BUY LAND—Royal Tallow & Soap Co., Inc., San Francisco, buys 4½-acre plot of land near Spokane for $800.

GRAYSTONE BUYS PLANT — Graystone Concrete Products Co., Seattle, buys Chehalis Ready-Mix Co. Present management will continue to operate plant, under name of Graystone of Chehalis.

BREA TO BUILD—Brea Chemical Co., subsidiary of Union Oil Co., Los Angeles, plans to build or lease tanks for a distribution station for liquid ammonia at either Pasco or Umatilla, one of 12 stations planned for Western states and Hawaii.

BUY SASH AND DOOR PLANT—Cruver-Langhardt Sash & Door Co. plant at Anacortes, which has been closed for 15 months, is acquired and reopened by United States Mill Work, Inc., Seattle. Operations will employ 35 to 40 men.

ARMY CONTRACTS—Army Ordnance District in San Francisco awards $590,800 supplemental contract to Pacific Car & Foundry Corp., Renton, for production of self-propelled heavy-artillery vehicles. An additional $66,000 contract is awarded Columbia Electric & Manufacturing Co., Spokane, for production of shell fins.

WYOMING

DISCUSS CHEMICAL PLANT—Meetings are held in Rock Springs and Hanna by interested businessmen to consider possibility of building $350,000 chemical extracting plant at Rock Springs.

WEIGH NEW PRODUCT — Jefferson Lake Sulphur Co. is considering manufacture of phosphatic fertilizers in Intermountain West, according to recent report of President Eugene H. Walet Jr. to stockholders. Company has begun construction of sulphur recovery plant at Manderson, Wyo.

PIPELINE PURCHASE—Franklin County Coal Corp., Wilmington, Del., submits plan for buying Plains Pipe Line Co. of Newcastle to Wyoming Public Service Commission. Total purchase offer is $2,025,000. Buyer reportedly plans to make extensions and improvements in line.

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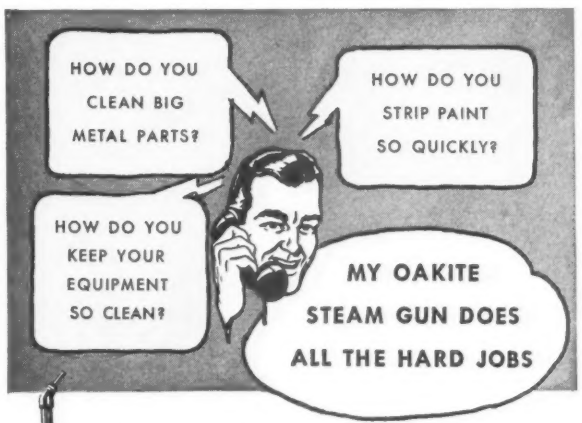
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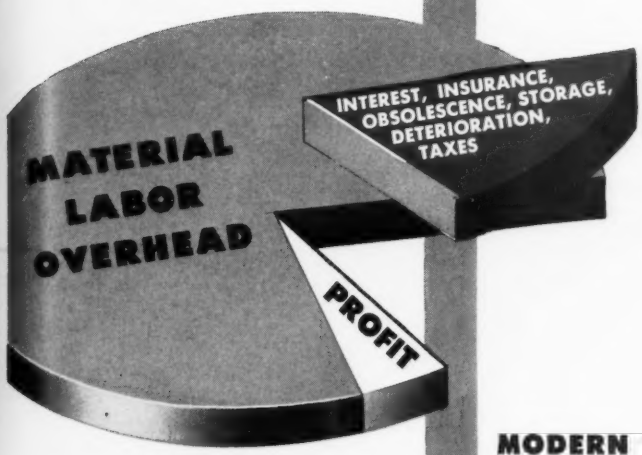

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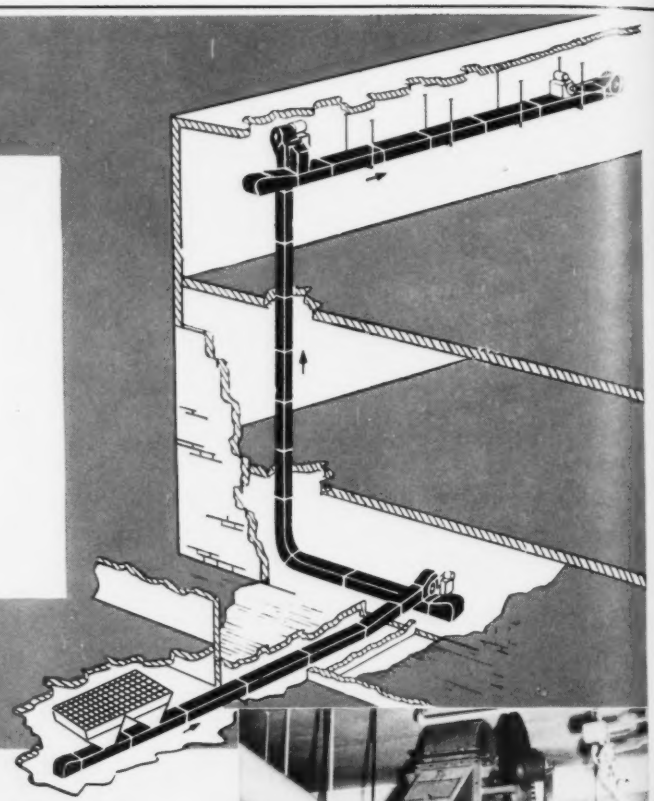

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Raw cocoa beans, shipped direct to the Schrafft warehouse, are delivered by a *sealed* REDLER Conveying System to the main processing building. Dirt never gets a chance to contaminate *these* cocoa beans—dust never escapes into the air!

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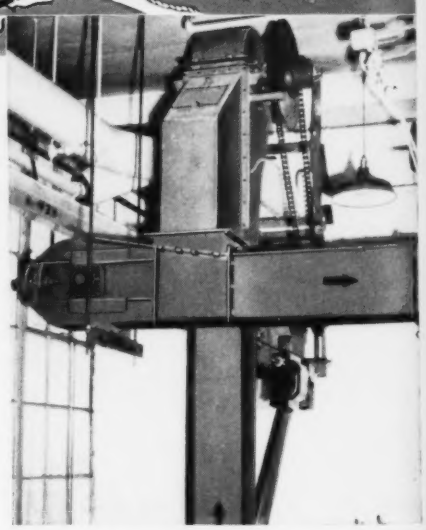
Whatever *your* business, if clean handling—in small space—at low cost per ton is important, it will pay you to find out how a REDLER Conveying System can meet *all three* requirements *easily*. MAIL THE COUPON TODAY!



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From storage, raw cocoa beans are fed into a 7-in. REDLER Conveyor running in a small tunnel to the main plant. In the plant basement they are fed into an L-type REDLER and lifted 45 feet. At the ceiling of the second floor they are picked up by another REDLER and carried to processing. ALL REDLER casings are gasket sealed to keep dirt out and dust in.

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